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Note.—Initialled abstracts are written by the following:

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* General studies, see also individual crops.

Plant Breeding Abstracts

Vol. XVI, No. 2

Part I. Empire Section

PERSONALITIES 007

494. HARLAND, S. C. and
DARLINGTON, C. D. 007:575(47)
Prof. N. I. Vavilov, For. Mem. R.S.
Nature, Lond. 1945 : **156** : 621-22.

This tribute to the late N. I. Vavilov gives an account of his wide achievements in plant breeding and genetics, plant exploration and taxonomy.

BREEDING 575

495. 575:061.3(42)
Notes and news. Biology and genetics.
Sci. and Cult. 1945 : **10** : p. 539.

Brief mention is made of the symposium on the Application of Genetics to Plant and Animal Breeding arranged by the Genetical Society in London in 1944, and of the conference on The Place of Science in Industry organized by the British Association in the following year.

496. 575:061.6(42)
The John Innes Horticultural Institution.
Nature, Lond. 1945 : **156** : 586-88.

An account is given of the past work of the John Innes Horticultural Institution and its future development is discussed in connexion with the move of the Institution from Merton to the new site at Bayfordbury in Hertfordshire.

497. 575:633
HUDSON, P. S. 575-17
Plant breeding and genetics today.
Advance. Sci. 1945 : **3** : 252-67.

The role in plant breeding of selection, intraspecific and interspecific hybridization, and natural and artificially induced polyploidy, is described. The importance is shown of the impact upon genetics of recent findings in the chemical approach to biological problems, such as the nature of the virus, and a discussion is given of the significance of work by Russian scientists, notably Lysenko and Michurin, who base their investigations upon principles of non-Mendelian inheritance.

498. 575:633(41.5)
Research and the farmer. IX. Plant breeding.
Mon. Rep. Minist. Agric. N. Ire. 1946 : **20** : 258-60.

Objectives of future breeding work are discussed with special reference to oats, flax and potatoes.

499. 575:633(42)
ING, E. G.
Research work at John Innes Horticultural Institution.
Worcs. Agric. Quart. Chron. 1945 : **14** : No. 1 : 83-88.

An account is given of a visit to the John Innes Horticultural Institution.

500. 575:633(54.8)
SENEVIRATNE, L. J. DE S.
Administration Report of the Acting Director of Agriculture, Ceylon for 1943 (1945) : Pp. D. 18.

Millet

Selection work has been begun in cumbu, tanahal and sorghum.

Rice

Several pure line selections have been tested in various districts. Dahanala 2014 has shown marked resistance to stem-borer attack. Selection of the hybrids Kurulutuduwi (b-13) x Hmawbi 39 and Baiang x Vellai Illankalayan was continued.

Potato

Progress has been made in selecting strains from wild South American species suitable for growth at low altitudes. The yields of 97, 89 and 90 have been satisfactory but further selection is required to improve tuber size.

Cassava

The work of collecting, classifying and testing the Ceylon varieties has now been completed. The highest yielding strains, e.g. MU. 11 and MU. 28 were found to contain the highest prussic acid content. Several hybrids between MU. 11 and strains with a low prussic acid content have been secured which yield as well as MU. 11 and have a satisfactorily low prussic acid concentration. The hybrids 16 (MU. 10 x 11) and 8 (MU. 13 x 11) are particularly promising.

Chillies

The heterozygous Tuticorin selection, H.I., has proved superior to the local unselected material in both yield and quality.

Cinchona

Nearly 30,000 seedlings of *C. Ledgeriana* were raised at Hakgala. Stem bark analyses have been made on two-year-old plants of *C. Ledgeriana*, *C. succirubra* and hybrids between the two species. In the bark of *C. Ledgeriana* 40% of the total alkaloids consisted of quinine. These *C. Ledgeriana* plants are to undergo selection.

Egg plant

F₁ hybrids between the selection, SM. 164, and the variety Erangerie outyielded both parents. The degree of hybrid vigour was not, however, sufficient to warrant the distribution of the F₁ to growers. The purple pigment in the stem, flower and fruit showed simple dominance in the F₁ and F₂ generations.

Gram

The pure line of green gram, PA. 178, was released. It gives high yields of large glossy seeds and is uniform in ripening.

501. DORASAMI, L. S.

575:633(54.8)

Brief sketch of work done in the botanical section.

Mysore Agric. J. 1944-45 : 23 : 61-62.

A brief survey is given of the work of breeding improved varieties in several crops during the last 25 years.

502.

575:633(67.61)

Annual Report on the Department of Agriculture, Uganda, for the period 1st July, 1943—30th June, 1944 (1945) : Pp. 10.

Cotton

A considerable number of black-arm resistant selections, representing 56 parent strains, have been obtained at Serere. At Kawanda the programme of repeatedly back-crossing to the black-arm resistant B.P. 52 has been continued. In district trials, the black-arm resistant B. 181 gave the highest yields in the Eastern Province. In north-west Uganda, S. 2103, a mass-selection of N. 17 out-yielded B. 181. Various studies of the relative susceptibility of different cotton varieties to *Lygus* are in progress.

Cassava

Clones have maintained their resistance to mosaic at Serere and 11 sub-stations.

Coffee

Varietal trials are reported. Individual trees of wild strains introduced from Abyssinia and elsewhere have shown promise.

Cinchona

Fuller analyses of bark from trees of varying girth have confirmed the hypothesis that the largest trees contain the most quinine. The seed of 15 selections have been sown at Kawanda with satisfactory results.

503.

575:633(68.3)

Annual Report for the year.

Veterinary and Agricultural Department, Swaziland 1944 : Pp. 26.
(Mimeographed.)

Maize

Selection in white flint strains and Hickory King, the white dent variety, was continued at Aird. Strains of kaffir maize have been mass-selected at the Aird and Croydon stations.

Cotton

The work at Aird consisted of trials of strains in collaboration with the Cotton Experiment Station at Barberton. The material included U. 4 strains and crosses between U. 4 and Cam-bodia strains.

504. KENNEDY, T. L.

575:633(71.3)

Report of the Minister of Agriculture, Province of Ontario, for the year ending March 31st, 1944 : Sess. Pap. No. 21 : Pp. 109.

Maize

The production of adapted hybrid strains has received attention.

Barley

Galore is a new hybrid smooth-awn variety developed at the Ontario Agricultural College. It has very strong straw, and has shown suitability for combine harvesting. Some new hybrids have exhibited outstanding mildew resistance.

Fruit

Varietal and seedling tests of several fruits are reported.

A new series of plum varieties, produced at Ottawa and named after the counties of Eastern Ontario, are now under test. The Grenville variety is mentioned as promising.

Ottawa, Rideau, Trent and Madawaska are promising new raspberry varieties.

In strawberry breeding, Early Ozark is outstanding as a parent variety. Out of 403 selections obtained during the period 1913-43, 285 are related to this variety. During this period four varieties have been named and introduced, viz., Vanguard, Vandyke, Vanrouge, and Valentine.

Vegetables

Varietal trials of 276 varieties of common vegetables have been conducted. The distribution of varieties and selections of asparagus, rhubarb, tomato, sweet corn, developed at the Vineland Horticultural Experiment Station, is reported.

505. KENNEDY, T. L.

575:633(71.3)

Report of the Minister of Agriculture, Province of Ontario, for the year ending March 31st, 1945 : Sess. Pap. No. 21 : Pp. 111.

Wheat

An extensive programme for the improvement of winter wheat was begun in 1943. A collection of winter wheat varieties has been obtained. To develop this new breeding material as rapidly as possible, a crop was grown in the greenhouse during the winter. A programme of regional testing has been put into operation, and satisfactory progress made in establishing a winter wheat testing laboratory.

Maize

Hybrids recommended for use in Ontario are listed.

Barley

New crosses were made. In progeny tests several strains show sufficiently low protein content for possible malting requirements, while several others possess high protein content.

Forage crops

Improved grass and clover varieties have been produced.

Potato

Variety but not method of storage has been found to be an important factor in determining the vitamin C content of stored potatoes.

Fruit

Tables are given summarizing breeding work in apple, pear, plum, peach, cherry and grapes during the period 1913-44.

International genetics conference.

Nature, Lond, 1946 : 157 : 35-38.

C. D. Darlington.

Four important lines of research have been pursued in Great Britain since 1939: (1) investigations into fungus genetics and consideration of the rate of cytoplasmic inheritance; (2) Mather's work on the mode of inheritance of quantitative characters; (3) studies on induced mutation and induced chromosomal aberration by means of neutrons and other agencies; and (4) direct investigations into the nucleic acid metabolism of the chromosomes.

J. B. S. Haldane.

A review was given of recent advances in animal genetics.

J. Huxley.

Progress in genetic research in relation to ecology and taxonomy was reported.

Ø. Winge.

An account was given of yeast hybridization and mutation.

M. J. Sirks.

Work on interspecific hybridization and the genetics of pigmentation in flowering plants was reported.

A. Müntzing.

The genetics of rye was discussed with reference to polyploidy and the presence of supernumerary chromosomes. In *Poa alpina*, a diploid species, the supernumerary chromosomes are lost in the root.

S. C. Harland.

The distribution of the glaucous gene of the castor oil plant in Peru is correlated with climate. A recessive mildew resistant gene has been found among the extremely heterogeneous Peruvian pea varieties. The photoperiodic behaviour of Peruvian potatoes was considered.

O. L. Mohr.

A technique for distinguishing between deficiencies and lethal mutations in *Drosophila* was described.

B. Ephrussi.

Consideration was given to various interpretations of the position effect.

P. L'Héritier.

Plasmagenic inheritance of *Drosophila* in respect of the sensitivity to carbon dioxide is described.

G. Teissier.

Experiments are reported on gene equilibrium in *Drosophila* populations.

J. Brachet.

Cytological researches are reported on the cellular distribution of the nucleic acids.

Discussion.

The organization and future possibilities of genetic research in Great Britain and Europe were discussed.

507. PONTECORVO, G.

575.1:581.192

Microbiology, biochemistry, and the genetics of micro-organisms.

Nature, Lond, 1946 : 157 : 95-96.

A review is given of the conference on "Gene Action in Microorganisms" published by the *Ann. Mo. Bot. Gdn.* The papers concerned have already been reviewed in *Plant Breeding Abstracts.*

508.

575.129

MAHESHWARI, P.

633.1:575.127.5

Some recent discoveries in applied biology.

633.61:575.127.2

Sci. and Cult. 1945 : 10 : 532-35.

Brief mention is made of the utility of chromosome duplication in reducing hybrid sterility and of Russian and Indian work on wide crossing in cereals and sugar cane respectively.

509. MAXIMOV, N. A.

Prof. B. A. Keller.

575.3:007

Nature, Lond. 1946 : 157 : 69-70.

This obituary notice of Professor Keller refers to his important ecological researches and to his belief that environmental factors exert some effect on the genotype.

CYTOLOGY 576.3

510. THOMAS, P. T.

576.35

Experimental imitation of tumour conditions.

Nature, Lond. 1945 : 156 : 738-40.

A valuable review is given of recent experiments in which tumour effects have been obtained in plants. When *Sorghum purpureo-sericeum* carries supernumerary heterochromatic chromosomes, the pollen grains divide to form an "encapsulated tumour." Yeast, after treatment with camphor, divides more rapidly and develops a larger nucleolus and an increased content of the two nucleic acids. Lactic acid has been shown to induce multipolar spindle formation.

It is suggested that the change from normal to malignant cells is brought about by mutation, possibly cytoplasmic. The formation of multipolar spindles is regarded as a secondary effect, possibly induced by excess lactic acid, which may have been produced through excessive growth, or as an effect of the modified nucleic acid metabolism.

511. LEVAN, A.

576.356:581.04

Cytological reactions induced by inorganic salt solutions.

Nature, Lond. 1945 : 156 : 751-52.

An account is given of the cytological effects of various inorganic salts. C-mitosis was observed after treatment with salts of lithium, beryllium, sodium, potassium, chromium, iron, cobalt, nickel, copper, arsenic, rubidium, yttrium, palladium, cadmium, barium, lanthanum, cerium, neodymium, erbium, gold, mercury, thallium, lead, bismuth and thorium. The activity threshold of c-mitosis tended to fall with increased molecular weight. Both lead nitrate and potassium cyanide induced c-mitotic effects indistinguishable from that of colchicine. Deviations from normal c-mitosis were observed in many cases, while with nickel nitrate the chromosomes behaved as in c-mitosis in spite of the development of a clearly visible spindle.

Chromosome stickiness was induced after many treatments, also alterations in staining reaction. Division of the metaphase chromatids was demonstrated after treatment with sodium fluoride, sodium molybdate, sodium tungstate, auric chloride, mercuric chloride, and phosphate-sodium hydroxide buffers. A marked differentiation between euchromatin and heterochromatin was obtained after treatment with mercuric nitrate.

PLANT DISEASES AND PESTS 632

512. PESHKOFF, M. A.

632.3:576.312

Fine structure and mechanism of division of the "nuclei" of the bacterium *Caryophanon latum*.

Nature, Lond. 1946 : 157 : 137-38.

Evidence is brought forward to support Robinow's theory that bacterial nuclei are solitary chromosomes comprising the entire genotype. The theory of the diffuse nucleus is rejected.

513. DELBRÜCK, M.

632.3:632.8-1.521.6:575.242

Bacterial viruses or bacteriophages.

Biol. Rev. 1946 : 21 : 30-40.

Papers published during the last three years on the bacterial viruses are reviewed. Bacterial mutation to virus resistance, the physiological nature of resistance, and virus mutation affecting the host range are among the problems discussed.

514. DEY, N. C.

632.421.2-2.3-1.521.6(54)

A preliminary note on the antibacterial substances from *Aspergillus flavus*.

Curr. Sci. 1945 : 14 : 265-67.

The production of an antibiotic substance from a strain of *Aspergillus flavus* is reported. The advantages of manufacturing an antibacterial substance from *A. flavus* instead of penicillin from *Penicillium notatum* under tropical conditions are described.

515. SANSOME, E. R. 632.422.3:575.1

Recent genetical experiments with yeasts.

Nature, Lond. 1946 : 157 : 52-53.

A short review is given of recent research on yeast genetics. Most of the work has been done in Denmark, America or India, the contributions of Winge and Lindegren being outstanding. Most of the papers cited have already been reviewed in *Plant Breeding Abstracts*.

516. SUBRAMANIAM, M. K. and RANGANATHAN, B. 632.422.3:576.356

Peculiar cytological behaviour of a distillery yeast.

Nature, Lond. 1946 : 157 : 50-51.

Several chromosomal aberrations are reported in a so-called pure strain of *S. cerevisiae*, resulting in considerable variability within the culture.

517. SUBRAMANIAM, M. K. and RANGANATHAN, B. 632.422.3:581.04:576.356.2

A new mutant of *Saccharomyces cerevisiae*.

Nature, Lond. 1946 : 157 : 49-50.

A chromosome deletion has been obtained in *S. cerevisiae* following treatment with acenaphthene.

518. WILKINS, W. H. 632.44:575.22

Investigation into the production of bacteriostatic substances by fungi.

Trans. Brit. Mycol. Soc. 1945 : 28 : 110-14.

Data have been obtained indicating that certain members of the larger Basidiomycetes produce anti-bacterial substances in sufficient amounts to justify further investigation. Variation ranging between a positive and negative result was observed between strains of a single species from different localities.

ECONOMIC PLANTS 633

519. DORASAMI, L. S. and GOPALA IYENGAR, K. 633-1.524(54.8)

Vegetables from wild plants.

Mysore Agric. J. 1942-43 : 21 : 32-35.

A list is given of some wild plants, commonly occurring in Mysore, portions of which are used as vegetables.

20. 633-1.531.12(71)

Annual Report of the Canadian Seed Growers' Association, Ottawa 1944-1945 : Pp. 78.

The report includes an account by N. Young of Canadian wartime seed production and distribution, and a discussion by T. M. Stevenson of the problems entailed in the seed production of improved varieties of forage crops. The summary of the proceedings at the 1945 annual meeting of the Canadian Seed Growers' Association contains the recommendations of the Standards Committee, such as the thousand kernel weight, to be used for oats and colour standards in small grains. Recommendations are also given for isolation requirements in several crops, the result of a comprehensive investigation by J. B. Harrington. Various recommendations are also made in the report of the Horticultural Section. The usual list of varieties and strains accepted for registration is given.

521. 633-2-1.521.6:575

Proceedings of the Association of Applied Biologists.

Ann. Appl. Biol. 1945 : 32 : 277-82.

A report is given of the Joint Meeting of the Association of Applied Biologists and the Genetical Society held on the 23rd March, 1945, which consisted of a symposium on the genetical relations of plants and animals to their pests and diseases. The following communications are of interest to plant breeders:—

Darlington, C. D. *Introduction: the genetic analysis of disease. pp. 277-78.*

The alteration in the interaction between host and parasite brought about by the improvement of crop and stock is discussed. It is pointed out that increasing uniformity provides the pest or disease with increasing advantage, an extreme example being the vegetatively propagated plant

clone subjected to the highly mutable and adaptable virus. The introduction of genetic variation into cultivated forms is advocated.

The importance to genetics of the results of recent investigations on the nature of the viruses is indicated.

Black, W.

Inheritance of resistance to blight in potatoes. pp. 279-80.

In investigations on blight resistance at the Scottish Plant Breeding Station *Solanum demissum* was used as the source of genes for resistance. Three strains of blight were isolated, viz., the common strain A, and strains B and C appearing on plants known to be immune from strain A. The following resistant phenotypes were distinguished: (1) plants immune from A, B and C, (2) plants immune from A and B but susceptible to C, (3) plants immune from A and C but susceptible to B, and (4) plants immune from A but susceptible to B and C.

Tests for resistance to strains A and B were carried out on derivatives of *S. Rybinii*, *S. demissum* and *S. tuberosum*. The data obtained from back-cross and selfed progenies indicate that immunity from strains A and B is determined by two major genes, designated *Ra* and *Rb*. Plants carrying *Ra* are immune from strain A only, while plants with *Rb* show immunity from both strains. Three groups of progenies were characterized by segregations containing susceptible seedlings in excess of the standard ratios. This deviation is attributed to differential compatibility between the gametes of *S. demissum* on the one hand and *S. Rybinii* and *S. tuberosum* on the other.

Cockerham, G.

Some genetical aspects of resistance to potato viruses. p. 280.

An account is given of the genes *Nx*, *Nb*, *Na* and *Nc*, determining hypersensitivity or necrotic reaction to the viruses X, Y, A and C, respectively. Material obtained at the Scottish Plant Breeding Station which shows resistance to virus Y and leaf roll is mentioned. Preliminary information on the possible modes of inheritance is summarized.

Jenkin, T. J.

Diseases and pests at the Welsh Plant Breeding Station, Aberystwyth. p. 281.

Reference is made to breeding for resistance to smut and eelworm in oats, to clover rot (*Sclerotinia trifoliorum*) and clover sickness (*Tylenchus devastatrix*) in clovers, and to blind-seed and cocksfoot moth attack in perennial ryegrass.

Williams, C. B.

General discussion and summing up. pp. 281-82.

M. B. Crane suggested that the disadvantages of vegetatively propagated crops might be avoided by the regular production of short-lived clones or of F_1 families sufficiently uniform for commercial purposes, and emphasized that virus infection upsets uniformity, even in clonal crops.

H. W. Howard reported that similar results to those obtained at the Scottish Plant Breeding Station had been obtained at Cambridge in investigations on potato blight resistance, using *S. demissum* as the source of immunity. In the F_6 and F_7 , however, there was some indication that the effect of modifying factors is important.

R. Stenton suggested that the ratio of diseased individuals in a mixed population of unknown genetic constitution might be found to be proportional to the number of recessives present.

C. B. Williams emphasized the importance of maintaining a high level of genetic variability in host plants and animals in disease and pest control.

522. FISH, S. 633-2-1.521.6:575.42(94.5)

The Plant Research Laboratories, Burnley. Wartime activities.

J. Dep. Agric. Vict. 1945 : 43 : 386-88.

It is mentioned that selection in commercial flax varieties for resistance to *Fusarium* wilt and the withertop disease caused by calcium deficiency has given promising results. Varietal resistance trials have also been carried out to determine the reaction of bean varieties to halo blight and of onion varieties to white root rot.

523. 633.00.14(42.59)

Twenty-fourth report and accounts of the National Institute of Agricultural Botany, Cambridge, 1942-43. 1943 : Pp. 16.

Twenty-fifth report and accounts of the National Institute of Agricultural Botany, Cambridge, 1943-4. 1944 : Pp. 14.

A summary is given of varietal trials of cereals, flax, sugar beet, roots, potato and vegetables. Fodder maize, sweet lupin and soya bean have been grown in observation plots.

WHEAT 633.11

524. PETERSON, R. F.,
LEJEUNE, A. J. and
LAIDLAW, H. C. 633.11:581.48:578.088(71)
**Identification of grain samples of hard red spring wheat varieties
grown in western Canada.**
Sci. Agric. 1945 : 25 : 711-17.

A scheme of rapid visual identification is given for the grain of eight varieties of hard red spring wheat, viz., Marquis, Reward, Renown, Regent, Thatcher, Apex, Garnet and Red Bobs.

525. HOYLE, S. S. 633.11-1.524(68.9)
Wheat growing in Nyasaland.
Nyasaland Agric. Quart. J. 1945 : 5 : No. 1 : 14-19.

The problem of finding suitable varieties for local conditions in Nyasaland among introduced varieties from other parts of Africa is discussed. So far Granadero Klein has given the most successful results.

526. 633.11-2.7-1.521.6:575(71)
100 new varieties of wheat tested on prairies for sawfly resistance.
Canad. Grain J. 1945 : 1 : No. 4 : p. 13.

A note is given on the programme of breeding sawfly resistant wheat varieties for Canada.

527. FULLER, P. 633.11:664.641.016(68.9)
An examination of the 1944 Southern Rhodesian wheat crop.
Rhod. Agric. J. 1945 : 42 : 459-66.

Notes on the baking quality of several varieties are included.

528. REDFEARN, C. and
FUGGLES-COUCHMAN, N. R. 633.11.00.14(67.8)
**Large-scale wheat production at Oldeani, Tanganyika Territory, in
1943 and 1944.**
E. Afr. Agric. J. 1945 : 11 : 122-29.

Data are given for several varieties in respect of yield, crop quality, the occurrence of rust diseases, the damage due to various pests and resistance to lodging.

BARLEY 633.16

529. KEEGAN, R. 633.16:575(71.3)
Barley in Ontario.
Bull. Ont. Dep. Agric. 1944 : No. 442 : Pp. 11.

Descriptions are given of varieties of different barley types. Breeding for resistance to mildew, smut and stem rust is in progress at the Ontario Agricultural College; testing for malting quality is also an important part of the work.

530. HLYNKA, K. 633.16:581.6:575(71)
**"Montcalm," new Canadian malting barley is result of 22 years of
research work.**
Canad. Grain J. 1946, 1 : No. 6 : 10-11.

An account is given of the new smooth awned malting barley, Montcalm, which has been developed at the Macdonald College, Quebec. It has been bred from a cross between MC 4917 and a blue-kernelled selection from Manchuria, Mandscheuri (1807 MC); MC 4917 was derived from a cross between the smooth awned variety Michigan 31604 and the six-rowed barley 4307 MC. Montcalm is slightly superior in yield and malting quality to the standard, O.A.C. 21.

RICE 633.18

531. SEN GUPTA, J. C. and
SEN, N. K. 633.18:581.143.26.035.1
Effect of vernalization and photoperiod on late sown Aman paddy—II.
Sci. and Cult. 1945 : 11 : 273-74.

Long photoperiods during the seedling stage tend to promote early flowering in the rice varieties. Bhasamanik, Idrasail, Kumargar and Tilkachary.

532. SARAN, A. B. 633.18:581.143.26.035.1:581.162(54)
Studies on the effect of "short" and "long day" treatment on the growth period and the flowering dates of different paddy varieties.
 J. Indian Bot. Soc. 1945 : 24 : 153-61.

Experiments have been carried out on the effect of short and long day light treatments upon flowering dates, with a view to facilitating intervarietal hybridization in paddy rice under conditions in Sabour.

In 20-day old seedlings of the pure strain 46 BK subjected to 20, 30 and 40 day periods of constant illumination the time of flowering was delayed by 10, 20 and 45 days, respectively.

The effect of short day treatment was studied in seedlings at various ages belonging to five pure varieties with different flowering seasons or fixed growth periods between germination and flowering. It was found that a variety may be induced to flower within 60-63 days of germination irrespective of the normal flowering behaviour. With short day treatment not only paddy varieties with different flowering dates can be made to flower at the same time but individual plants of a given variety can also be induced to flower in succession.

533. SARAN, A. B. 633.18-1.531.6
On the viability of paddy seeds *Oryza sativa*.
 Curr. Sci. 1945 : 14 : p. 271.

Several methods of storing seeds of paddy rice have been studied. Seeds stored with a desiccating agent gave 100% germination after a period of 27 months and contained 3-6% moisture. Seeds of the strain 36 B.K. were dried in the sun until the moisture content was reduced to 4-5% and 3-6%. The dried samples continue to show about 80% germination after seven years of storage in sealed tin containers.

FORAGE GRASSES 633.2

534. 633.263:575.127.2:575(93.1)
Short-rotation ryegrass. Its breeding and characteristics.
 N.Z. J. Agric. 1945 : 71 : 465-70.

An account is given of a new short-rotation ryegrass, designated H1, which has been selected from hybrids of perennial and Italian ryegrass. The new type becomes as rapidly established after sowing as Italian ryegrass, and is as palatable. In the first 13 months the total production of H1 in dry weight per acre was 24% higher than that of Italian and 26% higher than that of perennial ryegrass. Its winter production is somewhat lower than that of Italian ryegrass but superior to that of perennial ryegrass; in autumn it gives low yields, resembling Italian ryegrass. H1 is more persistent than Italian but less so than perennial ryegrass.

535. CALVERT, E. L. and MUSKETT, A. E. 633.263-2.421-1.521.6:575
Blind-seed disease of rye-grass (*Phialea temulenta* Prill. and Delacr.).
 Ann. Appl. Biol. 1945 : 32 : 329-43.

A brief discussion is included on the control of blindseed disease by breeding resistant strains of ryegrass. It has been found that in Northern Ireland under field conditions Italian and commercial perennial rye-grass are generally less susceptible than the recently introduced leafy pedigree strains of perennial ryegrass.

536. FRENCH, M. H. 633.287:581.192(67.8)
The compositions of different types of Star grass.
 E. Afr. Agric. J. 1945 : 11 : 100-03.

The valuation of various types of Star grass (*Cynodon plectostachyum*) by chemical analysis agrees with that based on grazing trials and it is therefore suggested that chemical analysis offers a time-saving means of estimating the relative values of different grass species and varieties.

LEGUMINOUS FORAGE PLANTS 633.3

537. FRYER, J. R. 633.31-1.531.12(71)
The alfalfa seed setting problem.
 Pr. Bull. Alberta 1945 : 30 : 10-12.

The problem of seed-setting in lucerne in Alberta is discussed with reference to environmental and hereditary factors.

538.

633.32:631.531.12(42.9)

British clovers for Britain. Welsh Plant Geneticist's conclusions.

Fmrs Wkly, Lond. 1945 : 23 : No. 19 : p. 18

A summary is given of the recently published report of investigations in red and white clover at the Welsh Plant Breeding Station, Aberystwyth (cf. Abst. 539 below).

539.

WILLIAMS, W.

633.32:631.531.12(42)

Varieties and strains of red and white clover—British and foreign.

Welsh Plant Breed. Sta. Aberystwyth 1945 : Ser. H. No. 16 : Pp. 26.

The distribution of early and late flowering clover in Europe is outlined. British and foreign varieties of red and white clover and the improved strains of both clovers are described, and the main conclusions regarding their value which have been reached as the result of the late R. D. Williams' work during the last 40 years are presented.

ROOTS AND TUBERS 633.4

540.

633.426:575(41)

Agricultural research in Scotland in 1944. The Scottish Plant-Breeding Station.

Trans. Highl. Agric. Soc. Scot. 1945 : 57 : 75-77.

Breeding work in swedes is reviewed.

The value of the method of obtaining self-fertilized seed in pollen-proof bags from single selected plants is discussed.

Among the hybrid strains tested since 1940, the more promising are now being intensively selected and bred.

Breeding for resistance to finger-and-toe is in progress.

Winter hardiness is receiving attention.

541.

BLACK, W.

633.491-2.411.4-1.521.6:575.127.2:575.11

Inheritance of resistance to blight (*Phytophthora infestans*) in potatoes : unbalanced segregations.

Proc. Roy. Soc. Edinburgh 1945 : 62 : Sect. B : 171-81.

The inheritance of reaction to the common or A strain of blight has been investigated in seedlings derived from the triple hybrid (*S. Rybinii* x *S. demissum*) x *S. tuberosum* and from the multiple hybrid W. 800 (2). The following five species have entered into the breeding of W. 800(2) : *S. Commersonii*, *S. Maglia*, *S. edinense*, *S. demissum* and *S. tuberosum*. The evidence obtained in a previous study by the author (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 405) and in the present investigation suggests that the primary reaction of resistance and susceptibility to blight depends upon two major genes, designated *Ra* and *Rb*, and that minor genes determine the degree of susceptibility in susceptible varieties and act as modifiers in resistant varieties. In general the segregations of resistant and susceptible plants in the various progenies do not agree with the standard theoretical ratios of 1 : 1, 3 : 1 and 15 : 1, a consistent excess of recessives being shown. It is suggested that the excess is largely due to differential compatibility between the "wild" gametes of *S. demissum* on the one hand and the gametes of *S. tuberosum* and *S. Rybinii* on the other. This interpretation is supported by the fact that the ratios in three consecutive back-cross generations of derivatives of the multiple hybrid show a progressive decrease in the proportion of recessives.

542.

633.491-2.412.5-1.521.6(42)

Trials of potatoes for immunity from wart disease.

J. Minist. Agric., Lond. 1946 : 52 : 475-76.

Notes are given on the following new varieties which have been added during 1945 to the list of approved wart immune varieties: Ulster Premier, Ulster Ensign, Arran Viking, St. Aidan, Ulster Commerce, Venus and Stormont Star.

543.

BALD, J. G. and

OLDAKER, C. E. W.

633.491-2.8-1.521.6(94)

Reactions of Tasmanian Bismark and Brownell potatoes to the commoner virus diseases.

J. Coun. Sci. Industr. Res. Aust. 1945 : 18 : 209-18.

A description is given of the reaction of the Bismark and Brownell varieties to leaf roll and the mosaic viruses X, A and Y.

544. HUTTON, E. M. 633.491-2.8-1.521.6:575.12(94)
**The relationship between necrosis and resistance to virus Y in the
 potato. 2. Some genetical aspects.**
 J. Coun. Sci. Industr. Res. Aust. 1945 : 18 : 219-24.

The occurrence of the heritable character of hypersensitivity to virus Y in hybrids involving standard potato varieties has been previously reported (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1261). In the present paper further data are given on the reaction to virus Y of hypersensitive seedlings selected from the original crosses and of hybrids obtained from crossings and selfings involving these selected hybrids. With few exceptions it was possible to classify a hybrid as giving one of six distinct types of tolerant and hypersensitive reaction. In breeding for resistance to virus Y the localized necrotic and top necrotic reactions are considered to be more valuable than the necrotic collapse. Once hypersensitive types have been selected in the hybrid progeny, crosses involving them produce 10-30% of hypersensitive seedlings. As breeding sources of hypersensitivity the varieties Snowflake, Katahdin and Brown's River have been found to be more promising than Bismark, Delaware, Factor and Sebago. The hypersensitive reaction to virus Y appears to depend upon one or more recessive alleles, tolerance to the virus being dominant.

FIBRES 633.5

545. 633.51:575(54)
**Twenty-third annual report of the Indian Central Cotton Committee
 for the year ended 31st August, 1944.**
 Bombay 1944 : Pp. 128.

An account of investigations carried out during the period under review at the Institute of Plant Industry, Indore, is published in the Annual Report of the Institute (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 468). The work of the other research stations is reported below:—

Broach

Breeding for wilt resistance, high yield and fibre length is receiving attention with the object of producing medium and long staple cottons to replace short staple types. The wilt resistant synthetic strain, Vijaya, has been developed from selections 1-2 and 1-6. Selections have been made for early maturity from nine promising early types. F_2 data from the cross K.5 x G.E.5 have confirmed the results previously obtained from K.F. x 1027 A.L.F., viz., that wilt resistance in *G. herbaceum* is due to a single factor.

Jalgaon

Selections from the cross Jarila x N.R.5 have given higher ginning out-turns than Jarila; the selections 403-5 and 670-4 have also shown higher yields. Progenies of Jarila are under observation for wilt resistance.

Surat

Promising wilt resistant hybrid selections have been secured. Fertile hybrids have been produced in previous years by back-crossing hybrids between American and Asiatic cottons to the American types. Families derived from six such back-crosses have been tested against 1027 A.L.F. and Co. 2. Certain families have equalled Co. 2 in yield; a number have also exceeded Co. 2 and 1027 A.L.F. in ginning percentage. Advanced generation back-cross selections combining satisfactory yield and ginning percentage have been made. The F_2 of crosses between the tetraploid (American x Asiatic) x *G. armourianum* and cultivated American types show wide variation in many morphological and economic characters, and have been selected for yield and ginning out-turn.

Viramgam

Breeding work aims at improving the yield, quality and earliness of Wagad cotton by selection in Wagad and hybridization with Surti-Broach strains, such as 1027 A.L.F. and B.D. 8, and Iranian *G. herbaceum* types.

Kaira

The attempt is being made to find a superior cotton to replace the Rozi type (*G. arboreum* var. *typicum*). Out of 58 Rozi selections studied 40 were found to be superior in yield and staple characters to bulked Rozi; a few were also early maturing and root rot resistant.

Gadag

The object of improvement work in the Dharwar-American cotton is the development of an early maturing type superior to Gadag 1 in yield, staple length, ginning percentage, and resistance to red-leaf. The strains 9766 and 441, derived from the back-cross (G1 x Co. 2) x G1, maintained their superiority over Gadag 1 in ginning percentage; the yield of 9766 equalled that of G1. The early maturing introduced strain LSS has been crossed with G1 and 9766. Crosses have also been made between G1 and 11 other varieties. Back-crossing the F_1 hybrids to G1 and the intercrossing of the F_1 hybrids are to be carried out next year.

Sind

At the Mirpurkhas and Oderolal stations hybridization between long staple Upland cottons from world sources and the hardest Upland cottons of Sind has been continued. Hybrid progenies have been obtained which are not inferior to Sind Sudhar and M. 4 in yield, and which are less susceptible to red leaf.

In a test of the reaction of eight varieties to jassid attack M. 4 and S.L.D. 1 showed the lowest infestation.

Punjab

Large scale tests of new selections from 289 F/43 and L.S.S. have been conducted. Selections of 289 F/43 possess a 3-4% higher ginning out-turn than the parent type while retaining its good qualities. Four selections of L.S.S. have matured earlier and given higher yields than the parent strain, and have also shown superiority in ginning out-turn. Several F_4 families of (920 Cambodia x 58F) x 289 F/43 and (920 Cambodia x 58F) x 124F have exhibited immunity to jassid and a finer quality of lint than any other variety grown in the Punjab. Hybridization is in progress between Punjab-American types, Co. 3 and Co. 4. Crosses are also reported between Punjab-American cottons and long linted types.

Crosses of Jubilee and Mollisoni with the wild Nigerian cotton, *G. anomalum*, and high quality *G. arboreum* types from southern India are being carried out to improve the lint of the desi cottons.

The work of improving the Punjab-American cotton, 289 F/K.25, has been continued. New selections giving high yields in comparison with 289 F/K.25, mass-selected 289 F/K.25 and 124 F have been obtained; densely hairy selections likely to prove highly jassid resistant have been secured from the cross 289 F/K.25 x 289 F/43. In a test of varietal resistance to jassid three selections of 289 F/43, viz., 233 F, 234 F and 238 F, were the most resistant.

Central Provinces and Berar

New strains are being tested against standard local cottons.

Madras

Biotypes with lower mortality rates and higher yields than the standard Co. 2 have been isolated. In the work of improving Mungari cotton, selections were obtained from crosses involving P. 26H, P. 710, Jarila and M. 274, which combined satisfactory yield, medium staple length, high ginning percentage and early maturity. A study of varietal resistance to stenosis in *G. arboreum* and *G. herbaceum* cottons indicated that only the varieties G.4M. 11 and G.9 were both resistant and consistently high yielding.

The range of variation in the different standard lint colour grades has been investigated in the Cocanadas cotton. It was found that the upper limit of improvement of lint colour by the method of single plant selection could only be grade 3 in this cotton. The studies also indicated that it would be necessary to determine whether the lint colour standards of the trade were the result of genetic or environmental factors. Crosses have been made between strains with different grades. Among selections from crosses between varieties with grade 3 lint, No. 805 was the most promising. Coloured types were generally coarser and less strong than the white selections. New crosses were effected to improve colour and staple length.

United Provinces

Strain D from survey material has given consistently high yields. Punjab-American cottons have been tested at several centres.

Hyderabad

Improved Gaorani strains have been tested against the local variety and Gaorani 6. The strains Gaorani 6-E-3 and 12 F-2 show particular promise. Early maturing selections of G.4M. 11 have been obtained.

The work of improving the Kumpta cotton and cotton for the Oomras tract is reported. It includes tests for wilt resistance.

Baroda

Karkhadi selections have shown less susceptibility to root rot than Broach 9 but give a poor spinning performance. Promising selections have been obtained in the work of improving Mathio cotton at Amreli. One of these selections, S.31, and C.520 were crossed in order to transfer the hardness of the latter to the former.

Bikaner

The new desi strain, Ganganagar 1 (R.18) is to be distributed.

Mysore

The breeding of improved types resistant to red leaf from local American cotton is in progress. Varietal trials of the new Mysore-American varieties, M.A. V. to M.A. IX, and Egyptian varieties are reported. The study of X-ray treated material has been continued. M.A. IX (X-ray treated Co. 2) combines drought resistance, high yield and long lint, and is expected to replace M.A. II in several districts.

546.

633.51:575(54.3)

Progress Report of the Cotton Genetics Research Scheme, Indore, Central India, for the year 1944-45. Pp. 37. (Mimeographed).

Work during the year under review upon the genetics of fuzz grades in *G. hirsutum* has confirmed the analysis made in previous years, viz.; simple dominance of tufted over fuzzy condition is only shown in the progeny of parents belonging to the same variety, and a single major gene determines the tufted condition but a large number of modifiers exist.

In a cross between Bishnoor (*G. arboreum*) and Malvi 9 (*G. hirsutum*) large boll size was found to be nearly dominant. Boll size showed a close association with leaf shape. In the F_1 of crosses between large balled varieties from the Punjab and a small-bolled Malvi upland cotton from Indore, bolls were obtained intermediate in size between those of the two parents.

It has been confirmed that a single recessive gene, designated *vc*, determines the presence of the 5-lock boll in *G. arboreum*. The gene *vc* is inherited independently of the gene *L* for leaf shape, *Lc*₁ for lint colour, *Pb* for pollen colour, *Ne* for nectaries, *R*₂ for anthocyanin pigmentation and *Ya* and *Yb* for petal colour. Selection to eliminate various degrees of fasciation, lateness and partial sterility is necessary before this economically valuable character can be exploited.

Work on the genetics of khaki lint colour has been continued. Various crosses among khaki, light khaki and grades of brown are in the F_1 generation.

A type of broad leaf found in one of the Mollisoni cottons of the Punjab, possessing a long and pointed middle lobe, behaves as a simple recessive to the usual form of broad leaf.

The genetic character of red leaf in *G. hirsutum* has been found to be histologically different from the red leaf due to nitrogen deficiency or water-logging, as well as from the red leaf associated with jassid attack as previously reported. Pure green- and pure red-leaved families have been compared for boll productivity; the red plants gave yields similar to those of the green.

The date of sowing was found to be an important factor in jassid resistance.

A selection of Dhar 43 apparently homozygous for wilt resistance showed an 8% mortality due to wilt infection under greenhouse conditions. An F_2 of the cross Dhar 43 x Chinese red spotless gave 29% mortality; it was found that the wilt resistant red spotless group of F_2 plants closely resembled the Chinese parent. In a trial of selected hybrid families several possessed as low a wilt mortality under field conditions as V. 434 and Jarila, and were superior to both Malvi and Dhar 43 in yield, ginning percentage and halo length.

Interspecific hybridization is mainly concerned with *G. Thurberi* and *G. Raimondii*. Some plants giving bolls and seed have been obtained from a cross between the doubled hybrid *G. arboreum* x *G. Thurberi* and *G. hirsutum*. The lint of these seeds is over 25 mm. long, fine, strong and slightly brown in colour; the seed is either fully fuzzy or naked, according to the *G. hirsutum* parent used. Selection for increased seed number per boll is in progress. The triple hybrid has also been crossed reciprocally with the two parents. The cross with *G. hirsutum* was only successful when the triple hybrid was used as the female parent; the cross with the other parent was successful in both directions, but more successful when the doubled hybrid was used as the female parent. The original doubled hybrid, *G. arboreum* x *G. Thurberi*, has exhibited seasonal rhythm in fertility. As the triple hybrid shows susceptibility to bollworm, work is in progress to determine whether the immunity of *G. Thurberi* can be transferred to Asiatic cottons and thence to the cultivated tetraploids. So far crossings between *G. Thurberi* and *G. herbaceum* and

between the undoubled hybrid *G. arboreum* x *G. Thurberi* and various *G. herbaceum* and *G. arboreum* types have failed. The undoubled hybrid *G. hirsutum* x *G. Raimondii* was back-crossed to *G. hirsutum* without success. The doubled hybrid has given some bolls and seed. While back-crossing the C_1 reciprocally to *G. hirsutum* did not give any bolls, some of the C_2 plants produced bolls, crosses between these plants used as female parents and *G. hirsutum* were successful. The hybrids exhibited a susceptibility to jassid attack similar to that of the *G. Raimondii* parent.

The seed of two American (M.U. 4 and X-4463) and two desi (Jarila and Dhar 43) cottons were subjected to different periods of cold treatment. The effects of this vernalization treatment upon germination and final stand, plant height, node number, earliness, halo length, ginning percentage, seed weight and crude yield were determined. It was found that only plants from seed of the American varieties showed the effects of vernalization. In the case of X-4463 a yield increase of 30–50% over the control resulted from cold treatment of the seed for 10–15 days. Marked differences in vegetative vigour, earliness and other characters were not, however, observed between the American and desi cottons from vernalized seed. The increased yield of the American varieties is therefore not at present explained; the experiment is to be repeated. A test is also to be made of the effect upon the seed of repeated vernalization.

The bulked strain developed from one of the selected progenies from X-ray treated seed of M.U. 4 was included in yield trials at Indore and Badnawar, and showed superiority in both ginning percentage and halo length to the control. It was demonstrated that such superiority resulting from X-ray treatment of the seed is not due to an extreme variation of M.U. 4, as critically suggested, but is actually due to the mutational effect of the X-ray treatment.

Further progress has been made in the statistical analysis of the data on halo length obtained from crosses between the Bengal strains, C520, R10, D77 and B.G. 9, and Jarila, the *G. arboreum* strains Gaorani 115, K456 and Shan 764. The genetic fraction of the total variability in the F_2 was estimated by the regression of the F_3 means on the F_2 parental values. The total F_2 variability does not differ appreciably among different crosses, but the genetic variability shows a considerable range of variability, roughly following the order of the regression coefficients, most of which were significant. The effectiveness of selection in raising the mean values of the selected progenies above the average for a cross was found to depend upon the initial average of the F_2 from which they were selected and the amount of genetic variability. Since high correlation exists between the F_1 and F_2 means, it is suggested that selection can be initiated in the F_1 . The method of estimating the potential scope for selection of material from different sources is being investigated.

The use of the discriminant function as a means of selecting phenotypes on the basis of numerical scores assigned to individual plants is described in an experiment with *G. arboreum* strains.

Some of the conclusions reached from the study of field plot technique are as follows:—(1) For a given plot size the standard error per plot does not increase appreciably with increase in plot number per block; (2) with an increase in plot size the standard error decreases steadily and the efficiency of the block increases; (3) the efficiency of the block is extremely low for all plot sizes when 120 or more plots are included in the block; and (4) with a limited quantity of seed, e.g. 150 seeds per plant, it appears impossible to obtain a significant difference of 10% between two progenies. The study has also shown that the common method of growing progeny rows in long continuous strips with controls at regular intervals is unsatisfactory, and that a compact block arrangement is more efficient.

547. DORASAMI, L. S. 633.51:575(54.8)
Improved varieties of cotton grown in the Mysore State.
 Mysore Agric. J. 1942-43 : 21 : 55-59.

An account is given of recently developed and introduced varieties of Mysore-American, Madras-American, Egyptian and Asiatic cottons. The work of acclimatization of long-staple cottons is in progress. Mention is also made of a programme of hybridization and selection to evolve new adapted strains.

548. SILOW, R. A. 633.51:575.113.3.061.63
The exchange of attributes between alleles.
 Pap. Genet. Soc., Lond. 1946 [4 January]: p. 3. (Mimeographed).

Anthocyanin pigmentation in *Gossypium arboreum* L. and *G. herbaceum* L. is determined by an

extensive series of multiple alleles with pleiotropic effect upon several organs of the plant; 22 alternative anthocyanin patterns behaving as unit complexes in inheritance are now recognized. The anomalous segregates which rarely occur can only be adequately explained as having arisen by the recombination of parental attributes. It is suggested that in view of the extreme multiple allelism, the pleiotropy, and instability characterizing anthocyanin inheritance in several diverse plant families, anthocyanin development is controlled by a single gene of a complex nature, rather than by an allelic system of distinct genes.

549. HUTCHINSON, J. B.,
STEPHENS, S. G. and
DODDS, K. F. 633.51:576.16:581.49:576.356.5
The seed hairs of *Gossypium*.
Ann. Bot., Lond. 1945 : 9 : 361-69.

With a view to obtaining data on the possible ancestry of the New World allopolyploids, a comparison was made of the seed hair development in plants obtained by pollinating the tetraploid 2 (*G. arboreum* x *G. Thurberi*), the tetraploid [2 (*G. arboreum* x *G. Thurberi*)] x *G. hirsutum*, and the hexaploid 2 (*G. hirsutum* x *G. Thurberi*), with pollen from New World cottons. It was shown that the D genome derived from the American diploid wild species is inert as regards type of seed hair development and the formation of convolutions, but has an important effect upon the quantity of seed hairs produced. It is concluded that the only amphidiploids likely to give rise to true lint hairs are those involving an Old World cotton and a fuzzy-seeded wild species with smooth, regularly thickened seed hairs. The suggestion is made that the D genome of the New World cottons originated from an American wild species closely related to *G. Raimondii*. The possible reasons why no allopolyploids have arisen between *G. Stocksii* and the Old World cottons are discussed. The data on hybrid vigour obtained from the interspecific hybrids available at the Cotton Research Station, Trinidad, show that in general genome differentiation results in low vigour. None of the hybrids between Old World cottons and *G. Stocksii* are superior in vigour to the parents, and cannot therefore be expected to survive in competition with the parent species.

550. VISWESWARA RAO, K. and
VASUDEVA SARMA, R. 633.51:581.192
Occurrence of gossypol.
Curr. Sci. 1945 : 14 : 270-71.

The gossypol content has been extracted by an improved method from the seed, root bark and stem bark of different *Gossypium* species. The root bark gave high yields of gossypol, and is a convenient source of extraction since, unlike the seed, it is oil-free. The gossypol extracts of the seed and root bark were found to be identical. No significant amounts of gossypol were extracted from the stem bark. The occurrence of gossypol appears to be restricted to the species of *Gossypium*.

551. 633.51:581.45:575.061.6(54)
633.51:581.45:632.19(54)
633.51-2.7-1.521.6(54)
What the scientists are doing. Red leaf in American cotton
(*G. hirsutum*).
Indian Fmg 1945 : 6 : 469-70.

An account is given of work in India on the causes and control of the three different types of red leaf occurring in American cottons.

552. AHMAD, N. 633.51:581.6(54)
Annual report of the Director of the Technological Laboratory, Indian
Central Cotton Committee, for the year ending 31st May 1945 : Pp. 47.

The results are reported of spinning and other tests on Indian cottons for the year ending 31st May, 1945.

553.

HANCOCK, H. A.

23. Measures to check deterioration in Egyptian cotton varieties.**Pt I—The Giza seed maintenance system.**

J. Text. Inst., Manchr. 1945 : 36 : T267-T277.

HANCOCK, H. A.

23. Measures to check deterioration in Egyptian cotton varieties.**Pt II—Development of new varieties.**

Ibid. 1945 : 36 : T278-T292.

HANCOCK, H. A.

23. Measures to check deterioration in Egyptian cotton varieties.**Pt III—Extent, nature, and causes of deterioration.**

Ibid. 1945 : 36 : T293-T310.

In the first part of this paper early methods of seed production in Egypt are discussed, and a detailed account is given of the pure line selection now practised at Giza. In this method the commercial crops of a variety are produced from the so-called renewal nucleus, which is in turn derived from a single plant selection. Every three or four years a fresh renewal nucleus is developed from another selected plant. Thus a succession of crops of a given variety are obtained from successive nucleus families, the maintenance of single permanent stock by roguing or similar methods being abandoned. It has been found that secondary selection, i.e., selection subsequent to the selection of the renewal nucleus, offers more possibilities of improving a variety than was formerly realized. The provisions of the Seed Control Law are examined, and the suggestion of a dated seed system is put forward.

Part II describes the production of new Egyptian varieties by selection of off-types from commercial crops, as exemplified by selection of Ashmouni, and by hybridization of pedigree lines. Hybridization with selection is carried out for several cycles. Varieties have been obtained by this method which show marked increases in yield and yarn strength in comparison with the best varieties available ten years ago. The response to selection is attributed to the recombination of plus and minus modifiers in polygenic systems, along the lines suggested by Mather (cf. *Plant Breeding Abstracts*, Vol. XI, Abst. 252).

In Part III, data on the deterioration of Egyptian varieties and the possible factors concerned are discussed. In the author's view, deterioration in general is due to the selective advantage possessed by minor and major genes of the "wild" type in a heterozygous population. An account is given of past and present methods of seed production and attempts to control deterioration, and the advantages of the method developed at Giza of producing pure seed, in combination with certain recent seed control measures, are analysed.

554.

MILLER, R. W. R.

633.51-2.7-1.521.6:575(67.8)

Experimental work.

Ann. Rep. Dep. Agric. Tanganyika, 31st December 1944 (1945) : p. 8.

At the Ukiriguru Experiment Station selection in cotton has continued. The production of a jassid resistant variety with a lint length not less than that of the variety at present cultivated is within sight.

555.

Investigations by the Plant Disease Division.

18th Ann. Rep. Agric. Res. Inst. N. Ire. 1944-45 : p. 15.

European and American fibre and linseed varieties and various selections were tested for resistance to *Polyspora Lini*, *Colletotrichum linicola*, *Phoma* sp., and *Melampsora Lini*. As in previous years, varietal differences in resistance to *P. Lini* and *C. linicola* were observed. In a test of 34 varieties to *Phoma* species a few showed some degree of resistance. Among the 50 varieties tested for resistance to *M. Lini* certain varieties, including some fibre varieties from the U.S.S.R., exhibited considerable resistance.

556.

GHOSE, R. L. M. and

PATEL, J. S.

633.523:575:578.08(54)

Jute breeding experimental technique. (Selection and handling of breeding material).

Agric. Res. Bull. Indian Cent. Jute Cttee 1945 : No. 2 : Pp. 23.

Under the following headings an account is given of the technique of breeding *Corchorus*

capsularis and *C. olitorius* which has been developed at Dacca: selection and testing of breeding material, seed, planning and preparation, cultural aspects, records and observation, selfing and crossing, and harvesting and preparation of fibre.

557. PATEL, J. S.,
GHOSE, R. L. M. and
DAS GUPTA, B. 633.523:575.11.061.63
The genetics of (*Corchorus*) jute. Part II. Inheritance of anthocyanin pigmentation.
Agric. Res. Mem., Indian Cent. Jute Cttee 1944 : No. 3 : Pp. 42.

The inheritance of the distribution of anthocyanin pigmentation has been studied in Indian strains of the two cultivated species of jute, *Corchorus capsularis* and *C. olitorius*.

Plants of *C. capsularis* show a very variable distribution of anthocyanin, ranging from full green to full red. Seven types have been distinguished and classed into three groups, viz., (1) full green plants; (2) green pigmented, and (3) red. *C. olitorius* plants are either full red or full green. The histological distribution of anthocyanin pigment has been investigated in the different types of *C. capsularis*. It is pointed out that in the natural population of *C. capsularis* the most common types are the full green and green coppery red, in contrast to the full red types usually cultivated which, although preferred by the cultivator, are neither superior in quality nor yield.

The data from numerous crosses within and between the three groups of *C. capsularis* have shown that the following genes are concerned in the production of the anthocyanin pattern: gene *C*, which is essential for the development of any anthocyanin pigment in the plant body and in the absence of which the plant is green; *A*, a gene determining pigment production with no visible effect except in the presence of *C*, and which is present in the multiple allelomorph series, *A*, *A^L* and *A^R*, affecting the intensity as well as the distribution of the pigment; and *R*, which acts as a reducer of pigment. The genotypes of the plants investigated in full green groups are *ccAARR* and *ccAArr*, the genotypes of the green pigmented group, *CCAARR*—green-coppery red, *CCA^LA^LRR*—green light red, *CCA^RA^RRR*—green red; those of the red group, *CCAArr*—coppery red, *CCA^LA^Lrr*—light red, *CCA^RA^Rrr*—red. Linkage was found between *C* and the gene *G* for pod shape.

Various methods failed to effect hybridization between *C. capsularis* and *C. olitorius*. Anthocyanin pigmentation in *C. olitorius* is controlled by a single factor pair.

558. 633.523:575.113.3.061.63
Progress of technical schemes. Agricultural research.
Bull. Indian Cent. Jute Cttee. 1945 : 8 : 401–02.

A note is given on the recent discovery of a new allele in the allelomorph series for pigment development in *Corchorus capsularis*, in addition to the alleles *A*, *A^R* and *A^L* previously reported (cf. Abst. 557 above). The new allele is intermediate in position between *A^L* and *A*, and it produces delayed development of the plant pigment.

559. GANGULY, J. K. 633.523:576.356:576.312.35
A note on the secondary association of chromosomes and the basic number in *Corchorus capsularis* Willd.
Sci. and Cult. 1945 : 11 : p. 272.

Observations on multiple chromosome associations in *C. capsularis* suggest that the basic chromosome number of this species is $x = 2$.

SUGAR PLANTS 633.6

560. MOBERLY, G. S. 633.61(68)
The replacement of Uba by new variety canes from 1936 to 1944.
Proc. 19th Ann. Congr. S. Afr. Sug. Technol. Ass., Natal 1945 : 29–34.

A survey is given of the use of different sugar cane varieties during the years 1936–44. The newer canes include Co. 281, Co. 290, Co. 301, C. 331, and the P.O.J. canes. Data are given of the sucrose percentage, seasonal trend of sucrose percentage, purity and fibre content.

561. D., H. H. 633.61:575(68)

Experiment station notes—Release of cane variety N:Co. 310.

S. Afr. Sug. J. 1945 : 29 : p. 505.

The parentage of the new cane N:Co. 310 is Co. 421 x Co. 312. It was developed in Natal from seed introduced from Coimbatore, and is the first locally raised seedling to be released for commercial planting. N:Co. 310 has a wide adaptability, but on the whole has given the best results on the heavy soils to which Co. 281 is adapted. It has so far proved disease resistant. It is drought resistant, and the cane has a high sucrose content.

562. MCINTOSH, A. E. S. 633.61:575(72.9)

Nobilisation in cane breeding at the British West Indies Central Sugar Cane Breeding Station and its practical results to date.

Proc. Mtg B.W.I. Sug. Technol. Barbados 1944 : 26-40.

The early noble cane breeding in Barbados by selection of open-pollinated seedlings and controlled hybridization between noble cane varieties of different origins, and the breeding by nobilization since 1928 are described. The survey covers breeding methods used in the production of series B.29' to B.46'.

The material imported for the nobilization work is listed. Notes are given on the 14 nobilized seedlings which have already achieved commercial status.

563. 633.61:575(72.98)

Reports on research work 1943.

B.W.I. Sug. Ass., Barbados 1943 : Pp. 49.

Reports on research work 1944.

Ibid. 1944 : Pp. 54.

The British West Indies Sugar Association (Incorporated) was formed early in 1942. Its membership is representative of the British West Indies sugar exporting colonies and presidencies, consisting of the Sugar Associations of Antigua, Barbados, British Guiana, Jamaica, St Kitts, St Lucia and Trinidad. Its purposes are to promote the sugar industry and research in relation to the industry, and to act as a source of information. In the annual Reports on Research Work, of which those for 1943 and 1944 have been received, useful surveys cover agricultural and technological researches in the British West Indies and British Guiana, the details of which are available in the original reports of the various research bodies concerned; reprints of articles on subjects of special interest are also included. It is hoped in due course to extend the scope of the annual report and provide an authoritative handbook.

564. WILLIAMS, C. H. B. and

FOLLETT-SMITH, R. R.

633.61:575(88)

Sugar agronomy in British Guiana.

Proc. Mtg B.W.I. Sug. Technol. Barbados 1944 : 96-107.

An account is included of cane variety work in British Guiana since 1881.

Trials in recent years have indicated that no purely noble cane is likely to out-yield P.O.J. 2878, the present standard. The following canes have, however, given 18-45% higher yields than P.O.J. 2878: D. 14/33, D. 419/33, D. 14/34, D. 166/34, D. 200/36, Co. 419, Co. 421 and B. 34104. D. 14/33 and D. 14/34 have shown a much higher quality than P.O.J. 2878, and four other canes are slightly better. Co. 419 and D. 166/34 have lower fibre contents than the standard, but the majority of the canes have higher contents.

565. WILLIAMS, C. H. B. and

CAMERON, C.

633.61:575(88)

Field experiments with sugar cane, XIII.

Sug. Bull. Dep. Agric. Brit. Guiana 1945 : No. 13 : 1-29.

WILLIAMS, C. H. B.

Report on the sugar experiment stations for the year 1944.

Ibid 1945 : No. 13 : 37-43.

Seedlings from interspecific and intergeneric crosses made in 1943 have been selected. Hybrids involving Glagah, Chunnee and noble canes, and one intergeneric back-cross involving sorghum, show the most promise.

Plant cane, first and second ratoon variety trials are reported. As a result it is recommended that plantings for 1945 should be confined to D. 14/33, D. 14/34, D. 200/36, B. 34104 and Co. 421.

566. YUSUF, N. D. and DUTT, N. L. 633.61:581.143.26.035.1:581.145.1(54.8)
Photoperiod in relation to flowering in sugarcane.
 Curr. Sci. 1945 : 14 : 304-06.

The study has been made of the effect of different light periods upon the flowering of sugar cane varieties at Coimbatore, with a view to controlling flowering for breeding purposes. Two varieties of *S. spontaneum*, which do not normally flower at Coimbatore, were induced to flower by treatment with long periods of darkness about eight weeks previous to the beginning of the flowering season. The times of flowering in three cultivated varieties, viz., P.O.J. 2725, P.O.J. 2714 and Co. 421, were delayed by seven to eight weeks by varying the day length. It was also found that the pollen sterile variety, Co. 421, produced 80% open anthers with well-developed pollen, when subjected to a 15 hours day length about 7 weeks before flowering was due. The pollen gave 10% germination.

567. Bureau of Sugar Experiment Stations. Gumming disease in Mossman. 633.61-2.3-1.521.6(94)
 Aust. Sug. J. 1945 : 37 : 251-53.

The bacterial gumming disease is described, with reference to varietal susceptibility and resistance.

568. HOLME, R. V. 633.61.00.14(72.92)
Annual report of the Agronomy Section of the Research Office of the Sugar Manufacturers' Association (of Jamaica) Ltd.
 J.A.S.T. Quart. 1945 : 9 : 1-36.

Varietal tests are reported in detail. Comments are given on the experimental and commercial performance of 11 leading varieties; recommendations are made for their future use.

569. SEALE, C. C. 633.61.00.14(72.92)
The results of variety experiments on sugar cane at Frome Central, Jamaica, 1943-44.
 Proc. Mtg B.W.I. Sug. Technol. Barbados 1944 : 108-12.

In the 1943-44 tests B. 34104 gave the best results under various soil and rainfall conditions. B. 3439 was the next best cane. B. 35245 and B. 37161 showed signs of promise. Data are given on the occurrence of mosaic. B. 34104 was the most heavily infected variety.

570. VENNER, A. K. 633.63-1.531.12(42)
Science and sugar.
 Fmrs Wkly, Lond. 1945 : 23 : No. 19 : 34, 37.

An account is given of the field and laboratory tests carried out at the breeding station and trial grounds of the British Pedigree Sugar Beet Seed firm at Maldon, Essex, in selecting for seed production.

STIMULANTS 633.7

571. STRYDOM, H. L. 633.71:575.12(68)
Production of Turkish tobacco in the Western Cape Province.
 Bull. Dep. Agric. S. Afr. 1944 : No. 244 : Pp. 28.
 (Stellenbosch-Elsenburg Fmrs' Ser. No. 167).

This bulletin includes a description of the new variety of Turkish tobacco, Elsenburg Turk, which has been bred by crossing the South African Soulook and Russian Samsun types. This variety is early maturing, producing light grain plants with a fairly large number of top-leaves. The colour of the cured leaves is lighter than in Soulook and the texture finer. The better quality of the new variety compensates for its relatively low yielding capacity.

572. THOROLD, C. A. 633.73-2.8-1.521.6(67.62)
Elgon dieback disease of coffee.
 Mon. Bull. Coffee Bd Kenya 1945 : 10 : 85-86, 95-98.

An account is given of investigations on the Elgon die-back disease occurring in Kenya, which shows constant association with the "hot and cold" condition and also certain similarities with

diseases reported in other coffee-growing regions high in altitude. The bronze-tipped, broad-leaved type of coffee is resistant to Elgon die-back and "hot and cold"; this resistant type may be expected to give satisfactory yields but its quality may be poor owing to malformed beans. Shade, either artificial or natural, controls both diseases, and differences in growth habit between shaded and unshaded trees correspond with similar differences between resistant and susceptible trees.

573. POSNETTE, A. F. 633.74:575.127.2:581.162.5

Inter-specific pollination in *Theobroma*.

Trop. Agriculture, Trin. 1945 : 22 : 188-90.

The results are reported of pollinations of *Theobroma cacao* by *Th. angustifolium*, *Th. grandiflorum* and *Th. (Herrania) balaoense*. Compatibility was found between the pollen of *Th. angustifolium* and the flowers of certain trees which are probably of pure or nearly pure Criollo type. In crosses with this species and Amazon types, only trees of the Nancy River type set flowers. Partial compatibility was observed between flowers of *Th. cacao* and the pollen of *Th. grandiflorum*. Flower setting was obtained from all but two out of 19 Amazon and Trinitario trees when pollinated with pollen from *Th. (Herrania) balaoense*. The significance of the discovery of some degree of compatibility between different species of *Theobroma* in breeding for resistance to diseases and pests is briefly discussed.

574. POSNETTE, A. F. 633.74:581.162.52

Incompatibility in Amazon cacao.

Trop. Agriculture, Trin. 1945 : 22 : 184-87.

A description is given of four types of Amazon cacao introduced in Trinidad, classified on the basis of petiole form and the pigmentation of the stamens. The groups consist of the Ecuador, Nancy River, Parinari River and Iquitos Calabacillo types. A high proportion of these Amazon cacaos were found to be self-incompatible; they differed, however, from self-incompatible Trinitario types in being cross-compatible. The data obtained indicate that the incompatibility genes tend to be different in each population of the Amazon types, the difference between the incompatibility genes of the Amazon and Trinitario types being complete. The possible mechanism and the genetics of self-incompatibility in cacao are discussed in the light of the available facts, and a hypothesis is put forward tracing the possible evolution of self-incompatibility in the various types.

AROMATIC PLANTS 633.8

575. 633.8:576.16:581.6

***Leptospermum citratum*. New physiological forms.**

Perfum. Essent. Oil Rec. 1943 : 34 : 6-7.

Two varieties, A and B, have been discriminated within the species *L. citratum*. Although similar morphologically, they differ in the composition of their essential oils.

576. NARASIMHA SWAMY, R. L. 633.83:575(54.8)
633.83:575.11

Notes on breeding *Elettaria cardamomum* Maton.

Mysore Agric. J. 1942-43 : 21 : 66-69.

In the cardamom breeding programme at the Government Coffee Experiment Station, Balehonnur, it is hoped to produce a variety showing vigour, high yield of good quality fruit, and resistance to katte, and also to the kajji disease which is transmitted by thrips. Crosses have been made involving the *mysorensis*, *laxiflora*, *major* and Manjarabad varieties. The F₁ progeny were as vigorous as the variety *mysorensis* or *major*. The height of the leaf stalk and the inflorescence habit tended to be intermediate between the two parents. Glabrous under-surface of the leaves appeared to be dominant over the pubescent condition.

OIL PLANTS 633.85

577. WEBSTER, C. C. 633.854.56:581.162.3:581.165(68.9)

A note on pollination in budded plantations of tung trees. (*Aleurites montana*).

Nyasald Agric. Quart. J. 1943 : 3 : No. 3 : 17-19.

Data have been obtained indicating that the provision of 5% of male trees in a budded plantation will secure satisfactory pollination, provided that some of the male trees have an early flowering habit.

RUBBER PLANTS 633.91

578. FORD, C. E. 633.912:575(54.8)

Ceylon clones—XI (1944-45).

Quart. Circ. Rubb. Res. Scheme (Ceylon) 1945 : 22 : 22-25.

Yield data are reported for the following selected Ceylon rubber clones from the first year of tapping to the season 1944-45: Millakande 3/2, Wagga 6278, Hillcroft 28, Millakande 1/3, Beau Sejour 3, Diyaberiakande 1 and Dalkeith 5315. The first three clones have been previously described and recommended for commercial planting; the last four are valuable only as seed parents. All seven clones have been used in the breeding programme.

579. BUDHIRAJA, K. L. and
BERI, R. 633.913:581.192(54)

Common latex bearing woody plants of India.

Indian For. Leaf., For. Res. Inst Dehra Dun 1944 : No. 70 : Pp. 18.

With the exception of *Cryptostegia grandiflora*, none of 46 species examined were found to possess a high rubber content and a low resin content. The following species, however, show a high resin content and also 15% or more rubber content: *Palaquium (Dichopsis) ellipticum*, *Madhuca (Bassia) latifolia*, *Ficus glomerata*, *Wrightia tomentosa* and *Poinsettia pulcherrima*.

580. MEHTA, C. R. and
MEHTA, T. P. 633.956:581.192

Chemical examination of *Ocimum canum* Sims.

Curr. Sci. 1943 : 12 : 300-01.

The results of the chemical analysis of the seeds and leaves of *Ocimum canum* Sims. are briefly reported. The essential oil content of the powdered seeds was approximately 10%, that of the fresh leaves 0.1%. The analytical constants of the oil are listed.

FRUITS AND NUTS 634

581. 634:575(42.23)
633.79:575(42.23)

General review of research work with lists of papers published during the year.

32nd Rep. E. Malling Res. Sta. 1944 (1945) : 17-33.

Hops

Tests of new seedling varieties have been continued. Four varieties, one of which is resistant to *Verticillium* wilt, have been submitted for brewing trial. A trial of Golding clones is reported. Tests of Wye seedling varieties for resistance to *Verticillium* wilt were continued.

Pome fruits

Selection work in apple and pear seedlings has continued. Particular attention is being paid to the flowering season of the apple seedlings, in order to obtain seedlings sufficiently late flowering to escape spring frost.

Material is being prepared for an extensive programme of crosses between frost-resistant and late blooming apples.

Raspberry

The study of the inheritance of the "sensitive" and "tolerant" reactions to the mosaic viruses is in progress. It is hoped to produce new "sensitive" canes of the Norfolk Giant type with improved yield and fruit qualities.

Strawberry

Seedlings from intervarietal crosses are under observation in the attempt to develop new varieties with vigour, good fruit quality and disease resistance.

582. 634:575(71.3)
Report of the Ontario Horticultural Experiment Station for 1943 and 1944.

1945 : Pp. 61.

A summary is given of breeding work at the Vineland Horticultural Experimental Station during the period of 1914-44, which has been mainly concerned with the improvement of apple, pear, plum, peach, cherry, grape, raspberry and strawberry. The 17 varieties of sweet cherry, peach, pears, raspberry and strawberry, developed at the Station during these years, are described.

Detailed accounts of peach and strawberry breeding are given.

The main objective of peach breeding at present is the development of superior yellow-fleshed, free-stone, early maturing varieties. Resistance to disease is also receiving attention. In certain progenies marked differences have been observed in susceptibility to mildew [*Sphaerotheca pannosa* (Wallr.) Lev.], bacterial leaf spot (*Pseudomonas pruni* Smith), and brown rot [*Sclerotinia cinerea* (Bon.) Schr.]. The wild peach *P. Davidiana* from China has recently been used in breeding for improvement in the tree characteristics of commercial varieties. Data from breeding work conducted during the period 1911-39 indicate that the following varieties are the most promising parents: Early Elberta, Fisher, Halehaven, J. H. Hale, Valiant, Vaughan and Vedette.

Tables summarize strawberry breeding work carried out from 1913 to 1944, giving the parentage of crosses, the number of selections, and other data. Early Osark has been outstanding as a parent variety.

583. SAGER, R. 634.11-2.3-1.521.6(71.5)
Relative fire-blight injury of 117 varieties of apple.
 Hort. News 1944 : 25 : p. 1619.

Tables are given showing the relative susceptibility of apple varieties to fire-blight under New Brunswick conditions.

584. GUHA, M. P. 634.39:577.8
On the occurrence of a mixed inflorescence in *Artocarpus integrifolia*, Linn.
 Sci. and Cult. 1945 : 11 : 99-100.

An inflorescence of *A. integrifolia* has been observed at Dacca in which male and female flowers are present together.

585. VENKATASUBBAN, K. R. 634.6:576.312.35:576.16
Cytological studies in Palmae. Pt I. Chromosome numbers in a few species of palms of British India and Ceylon.
 Proc. Indian Acad. Sci. 1945 : 22 : Sect. B : 193-207.

Chromosome counts have been made in the root-tips of 30 species belonging to the Palmae, representing 23 genera. It is suggested that $n = 16$ is the primary chromosome number in this family, and that the two other commonly occurring numbers, $n = 14$ and $n = 18$, were derived from the ancestral number by chromosome fusion and fragmentation respectively.

586. GROSZMANN, H. M. 634.774:575.42(94.3)
Pineapple plant selection, with special reference to the elimination of inferior types.
 Qd Agric. J. 1945 : 61 : 203-15.

Desirable and undesirable plant and fruit characters are described and illustrated.

FORESTRY 634.9

587. 634.97:575(54+59.2)
Forest Research in India and Burma 1942-43. Part I. The Forest Research Institute.
 For. Res. Inst. Dehra Dun : Pp. 144.

Material for the study of the inheritance of high resin-yielding capacity in *Pinus longifolia* and of racial characters in *Butea frondosa* and *Schleichera trijuga* was mentioned.

588. JOHNSON, L. P. V. 634.975:575.14
Reduced vigour, chlorophyll deficiency, and other effects of self-fertilization in *Pinus*.
 Canad. J. Res. 1945 : 23 : Sect. C. : 145-49.

Scots pine (*P. sylvestris*) and red pine (*P. resinosa* Ait.) showed a marked reduction in seed set in self-pollinated cones, in comparison with naturally pollinated and artificially cross-pollinated cones; the percentage of seed emergence, observed only in the case of Scots pine, also showed reduction. The white pine (*P. Strobus* L.) exhibited no appreciable differences in seed set and

emergence in cones subjected to natural pollination, artificial cross-pollination and selfing. Two-year-old selfed seedlings of both white and Scots pines were significantly less vigorous than seedlings from the open and cross pollinations. About one quarter of the selfed progeny of the white pine showed marked chlorophyll deficiency and poor growth. The results are discussed in relation to the occurrence of chlorophyll deficiency in *Pinus* and to the silvicultural practice of seed-tree cutting.

VEGETABLES 635

589. HUGHES, H. M. 635.64.00.14(42.23)
Outdoor tomato trials, 1944.
 32nd Rep. E. Malling Res. Sta. 1944 (1945) : 38-43.
 A report is given of trials of standard and bush varieties. None of the bush tomatoes showed marked superiority in yield to the standard varieties, and it was found that the bush types require some form of support. The bush varieties, First in the Field and Stambovoi, are recommended for further trials.
590. RAPHAEL, T. D. and WHITE, N. H. 635.652-2.3-1.521.6(94.6)
Varietal resistance to halo blight in beans.
 J. Aust. Inst. Agric. Sci. 1944 : 10 : 76-77.
 The reaction of 12 bean varieties to *Pseudomonas medicaginis* var. *phaseolicola* has been observed in a trial conducted at the Summerleas Horticultural Experiment Station, Tasmania.
591. RAPHAEL, T. D. 635.656.00.14:581.6(94.6)
Canning peas trials, 1944.
 Tasm. J. Agric. 1945 : 16 : 24-29.
 Field and canning trials are reported.
592. KADAM, B. S., PATNAKAR, V. K., PATEL, S. M. and CHAUDHARI, B. B. 635.657:575.42(54.7)
Chafa—a new variety of gram from Bombay.
 Indian Fmg 1945 : 6 : 444-46.
 Chafa has been selected from the local variety of the Satara district. It has golden yellow grains, and has given higher yields than the local variety in several trials. Chafa matures earlier and more uniformly than the local grams, and has larger grains, thus giving a higher thousand grain weight in spite of the fact that the local variety yields a greater number of seeds per plant. The new variety also possesses better water absorbing capacity and parching quality. Two defects have to be eliminated by further breeding, viz., its susceptibility to wilt and the change in the colour of the grain to a reddish colour when stored.
593. MATHER, K. and BARTON-WRIGHT, E. C. 635.67:577.16:575.11
Nicotinic acid in sugary and starchy maize.
 Nature, Lond. 1946 : 157 : 109-10.
 Sweet corn appears to have a significantly higher nicotinic acid content than ordinary maize. This difference is ascribed provisionally to the *Su su* allelomorphs.

Part II. Foreign.

STATISTICS 519

594. PÉREZ CALVET, R. 519.24:631.421
Un estudio sobre las experiencias de uniformidad y su empleo en la elección de parcela de repetición. (**A study on uniformity experiments and their use in the choice of replication plots**).

Bol. Inst. Invest. Agron. Madr. 1945 : No. 12 : 329-48.

Uniformity trials were made at the Aranjuez Horticultural Station with the potato variety Merkur and the cabbage variety Murciano. From an investigation of the most advantageous size of replication plot, the author was able to confirm the conclusion that the regression of the logarithm of plot variance on the logarithm of plot size was linear.

595. SIAO, F. and CHENG, C. C. 519.24:633-1.421(51)
(**A study on the efficiency of quasifactorial design**).
Kwangsi Agric. 1942 : 3 : 371-84.

The methods of quasi-factorial design and randomized blocks were compared in 36 variety tests of maize, wheat, rice, cotton, sugar cane and peanuts. In only two of the tests were significant varietal differences shown in the randomized blocks but not in the quasi-factorial design. The quasi-factorial design was found to be relatively more efficient in 24 tests. With over seven plots, the efficiency of this method increased with the number of plots; it was also found to depend upon plot size, and the division of the larger blocks into sets is considered to be more advantageous than the division of the smaller ones.

BREEDING 575

596. ZHEBRAK, A. R. 575(47)
Soviet biology.
Science 1945 : 102 : 357-58.

In reply to a criticism by Sax (see *Plant Breeding Abstracts*, Vol. XIV, Abst. 1125) of the position of genetics in the U.S.S.R., the author presents evidence of the progress being made to-day in Russian genetical research. It is pointed out that Soviet genetics is not to be confused with the genetical system of Lysenko which the author regards as naive and purely speculative. Although affirming the value of dialectical-materialism in solving scientific problems, Lysenko's claim to have disproved Mendelism by its means is not regarded as well-founded.

597. 575:633(47)
(**A description of the products, soils and climate of the station**).
Naučnyĭ Otčet Narymskoĭ Gosudarstvennoĭ Selekcionnoĭ Stancii za 1941-1942 gg. (Sci. Rep. of the Narym State Plant Breeding Station for 1941-1942)
Moscow 1944 : 5-8.

An account is given of breeding and seed production in cereals, forage crops, small fruits and vegetables.

598. 575:633(47)
New varieties of agricultural plants.
Agriculture, Moscow 1945 : No. 3 : 2-3.

A brief account is given of the following recent achievements in breeding work.

At the Siberian Research Institute several new crop varieties adapted to local conditions have been developed. These include: (1) the exceptionally hardy winter wheat, Steppe; (2) a very early white grained pea variety, Arctic, which matures in 60-65 days, and is suitable for the northern regions of Siberia, including the sub-arctic zone; and (3) a medium early potato variety, Siberian, with large tubers, good cooking quality and a productivity 25% above that of Early Rose.

The 17 new varieties of spring wheat bred by Shekhurdin at the Research Institute for Grain Farming, Saratov, have given higher yields in farm tests than the varieties commonly cultivated in the south-east of the U.S.S.R.

The rice variety, Krasnodar 3352, produced at the U.S.S.R. Rice Experiment Station has given consistently high yields over a five-year period. It is resistant to fungous diseases, lodging and shedding, and its grain has good milling quality.

599. 575:633(47)

(Plant breeding and seed production).

Naučnyi Otčet Narymskoi Gosudarstvennoi Selekcionnoi Stancii za 1941-1942 gg. (Sci. Rep. of the Narym State Plant Breeding Station for 1941-1942) Moscow 1944 : 9-49.

Varieties of cereals, forage crops, potatoes, roots, vegetables, and bush and tree fruits are being bred for the Narym region in the Arctic. Breeding methods are discussed in the case of many of the crops. Rich material for breeding is being obtained by drawing upon both local and introduced varieties. A number of varieties that have already been developed are described, and a detailed account of the problems of seed production is included.

600. 575:633(47)

(Turkmenistan Experiment Station of the All-Union Institute of Plant Industry).

Vestnik Socialističeskogo Rasteniévodstva (Soviet Plant Industry Record) 1940 : No. 5 : 188-91.

This summary of work in 1939 refers to the history of the station and its objects. At present it is concerned with the study of both wild plants and crops in various localities with a view to producing varieties suited to the mountainous districts of the republic. Collections have been made of fruits, vines, long-stapled cotton, cereals and ornamental evergreens.

Regionalized distribution of suitable varieties of fruit trees has been organized and five selections from wild almond trees have produced varieties not inferior in quality to the standard varieties and more tolerant of local conditions.

The vine plantations include a collection of Central Asiatic, Transcaucasian and European forms, and variety trials of vines comprise various types for dessert and for wine.

A monograph is being prepared on the vines of Turkmenistan.

Ecological studies (observations on reactions to external factors) of pistachios, almond species and pomegranates have already given some results.

Sea Island cotton from Trinidad is being used for breeding. In 1933 this variety, in spite of frosts and other unfavourable weather conditions, gave a high yield of good quality, and in 1938 valuable constant, early lines were obtained. Lines 1661 and 1665 had a staple length of 47-53 mm., with a capsule weight of 3-4 grm., a lint output of 23-31%, a vegetation period of 151 days and a cotton yield of 80-100% gathered before the frost.

The grain resources of the region, which have been surveyed with a view to future selection, include wheats and barleys, some comprising new types among which both winter and summer forms occur.

Ornamental plants of various kinds are also being introduced and tested.

601. 575:633(47.1)

VALLE, O.

633-1.521.5(47.1)

Sort- och standardiseringsfrågan i Finland. (The variety and standardization problems in Finland).

Årsb. Jordbruksforskning, Stockholm 1945 : 145-50.

A concise note on the past and present situation in regard to variety trials in Finland is accompanied by a list of (a) 17 new varieties produced by the Finnish Agricultural Research Institute now situated at Jokioinen, and (b) the 50 varieties placed on the market by the Tammisto Plant Breeding Institute. Group (a) comprises the Toivo, Ensi and Pekka ryes; Pohjola and Olympia winter wheats; Söpu and Hopea spring wheats; Simo oats, Vankkuri barley, and the Artturi, Koivisto, Kaleva, Sinikka and Paula peas. Group (b) includes Oiva rye, Varma and Panu winter wheat, Tammi and Kimmo spring wheat, Helmi and Tammi barley, Osma II, Kytö and Tammi oats, Tammisto early potato and numerous Tammisto strains of clover and forage grasses. Official measures adopted to ensure that only new (Finnish) varieties shall be introduced into agricultural cultivation include the establishment of minimum periods of years for trials at the research centre and on the experimental farms.

Eight new experimental farms were set up during the twenties and thirties so that a reliable

picture of the performance in various parts of Finland of a new variety can be rapidly obtained. Trade in foreign varieties is, however, completely free and even though all efforts are made to determine the value of new foreign, especially Scandinavian, varieties, experience shows that such improved forms, though they may have got a footing in the country, often turn out after a short time to be unsuitable to Finnish conditions.

The situation leading up to the standardization of bred varieties of crop plants is outlined, with notes on approved standard varieties of cereals and other crops. In 1933 it became clear that, in addition to standard varieties, another class of worthwhile varieties (designated "odlingsvärd") should also be established, consisting of potential standard varieties that had not yet finished their trials.

A list of standard varieties in Finland in 1939 is given. Most of the winter varieties have been bred in Finland; the Estonian rye, Sangaste, is the only foreign rye sufficiently winter hardy for Finland.

Standardization has greatly reduced the approved number of varieties of spring cereals. Spring forms include many Svalöf productions. The potato varieties, approved in 1944, include Tammisto Early and Vesijärvi (Harbinger).

602. **TORSSELL, R.** 575:633(48.5)
 De senaste resultaten för praktiken från vår växtförädling. (**The latest results for the practical man from our plant breeding**).
 Årsb. Jordbruksforskning, Stockholm 1945: 39–51.

This report on progress in Swedish plant breeding mentions new varieties of various crops, though in many cases there are not yet enough data for exact determination of their possibilities as regards yield.

Most of the varieties have been already mentioned in Swedish annual reports, etc., reviewed in *Plant Breeding Abstracts* or in the Variety Lists issued by the Imperial Bureau of Plant Breeding and Genetics. Among the varieties not thus mentioned are:—

Oats

The oats released in 1943 included Trio derived from (Eko x Argus) x Drott [King] x Argus. It has white, yellow and black varieties in its ancestry. The husk is white with a yellow tinge. This variety has proved superior in grain yield to Seger [Victory] in some trials, and in hectolitre weight and chaff percentage to Seger and Guldregn II [Golden rain II]; the thousand corn weight is lower than that of Seger but higher than that of Guldregn II.

Winter rye

The most important ryes, in addition to Petkus, are: Petkus II (which has a shorter straw than Petkus) from Weibullsholm; the Svalöf production Stål [Steel]; Kungsråg II [Kings rye II] which has shorter and stiffer straw than Stål; and Agro, which was put on the market in 1938, and has given good yields and possesses a stronger straw than previous varieties.

Pasture grasses

Svalöfs Primus, a new strain of *Poa palustris*, put on the market in 1943, is a tall, early leafy type.

Root crops

The new Svalöf fodder beet Röd Kägla [Red Cone], from Röd Oberndorfer x sugar beet, was released in 1944; the plant is tall and the root is a short, flattened cone and is easily machine-harvested in the same way as swedes. The percentage dry matter content is 17.0–17.5%, the foliage is luxuriant and bolting rare. The same advantages, as regards harvesting, are claimed for Hammenhøgs Globus fodder beet, put on the market in 1944, a selection from the English variety Perfection. The original object in this case was to improve the shape of the root and eliminate branching. Globus is almost spherical and grows about two-thirds above the soil and can therefore be harvested like the swede. The dry matter content is not high, but yield of roots is high. The turnip Immuna II strain 26, a Weibullsholm product released in 1943, which was obtained from the cross (Naepérova Marienlyst V x a red topped Bortfelder line) x Immuna strain 8, is resistant to club root, and represents an advance as regards yield of dry matter. In the latter respect it equals the best Bortfelder strains on the market, while surpassing them in shortness of the growing period.

Potatoes

Intensive breeding is in progress, improved yield, quality and resistance to disease being the objectives. In the spring Svalöf released the variety Karna from a cross of Unica and Athene:

it is very late and the foliage is highly resistant to blight; its quality is exceptionally good, though the yield is relatively low, and it is therefore intended mainly for culinary use.

Peas

Table and fodder peas for various parts of the country have been produced and quality is receiving general attention in regard to the culinary pea of which a new variety Kloster is announced. (Cf. Abst. 734).

603.

575:633(51)

A summarized report of the experimental and extension work by the Szechuan Provincial Agricultural Improvement Institute. 1936—Present.

Szechuan Prov. Agric. Improv. Inst. 1944: Pp. 12.

Wheat

The best selections of native wheat are only slightly better than the local wheats. Advanced hybrid lines appear to be promising and are to be distributed in the near future.

Maize

Inbred lines have been developed at different stations. Some double crosses have outyielded the native variety by 30% in two years' field trials, and will shortly be released commercially.

Barley

From several thousand lines, two high-yielding ones have been selected which are resistant to covered and loose smuts.

Rice

Pure line selections have outyielded local varieties by 8.4–20%. Promising hybrid lines have been obtained.

Sweet potato

Sweet potatoes occasionally flower in Szechuan but hardly ever set seed. By girdling the stem and training the haulm on a trellis, seed setting has been secured. Certain of the seedlings show promise, being comparable with the variety Nancy Hall.

Fruit

A programme to improve several kinds of fruit has been initiated.

Soya bean

Promising selections have been developed.

604.

575:633(51)

Report of the National Agricultural Research Bureau, Ministry of Agriculture and Forestry 1932-1944.

Sino-British Co-operation Office, 19th April 1945: Pp. 36.

Wheat

Pure line selection of native varieties is in progress in Shensi and Yunnan. Among the 1700 world wheat varieties of Percival's collection, a selection of an Italian variety, Milturum,* now known as National 28, was chosen for distribution in the Yangtze Valley. It is resistant to lodging, stripe rust and loose smut, and outyields the local variety by 12%.

On the basis of eight years' tests, 14 hybrid strains were chosen for regional tests, which have been carried out since 1941 at 35 co-operative stations in 13 provinces. Four strains are particularly promising in several characters in the Yangtze and Hwai Valleys, viz., National 62, 166, 483 and 690.

It has been concluded from the results of 10 years' tests that in general foreign varieties are more resistant to stripe and leaf rust than the local ones; less than 1% of Chinese varieties have exhibited rust resistance.

In Kweichow and Szechuan, tests for scab resistance have included 41 varieties. Only the variety Maodinghoma has proved to be immune to scab. High correlation has been found between chaff colour and scab resistance; nearly all red-chaffed varieties are highly resistant, while white-chaffed varieties are in general highly susceptible. Future work is to be concentrated on the study of the inheritance of scab resistance and the production of immune or highly resistant varieties.

* ? Milturum.

Among thousands of strains tested for nematode resistance, five strains have been found to be completely or very highly resistant, viz., P.C. 876, P.C. 690, P.C. 171, P.C. 633 and H.R. No. 2. Breeding work is in progress to secure resistant and early maturing wheats. Approximately 2000 Chinese wheat varieties have been collected during the last two years and grown at the Peipeh experimental farm, Szechuan, with the object of classifying them morphologically. Crosses have been made to investigate stripe and leaf rust resistance, yield, and date of heading. Indication has been obtained of the transgressive inheritance of earliness and yield, and the desirability of genetic diversity in crosses between Chinese and introduced varieties of *Triticum vulgare* has been demonstrated.

Maize

After several years' trials none of the local varieties are found to be worth further multiplication, and the hybrids introduced from the United States have failed to show any superiority over the best local varieties and are late maturing. Top, single and double crosses of inbred lines of Chinese maize have been tested in Shensi. Four combinations are promising but, like the introduced hybrids, too late maturing. Future breeding work is to be devoted to the production of early high yielding hybrids.

Rice

Pure line selection has produced six promising strains adapted to various regions in south-west China. Hybridization and other genetical investigations have shown that the "small glutinous rice" belongs to *Oryza indica*, the "big glutinous" rice to *O. japonica*. Investigations have confirmed Kato's findings that crosses between *O. indica* and *O. japonica* types always show sterility in the F_1 and that intervarietal crosses within each species are more fertile.

Cotton

Cultural data indicate that the distinct cotton growing regions of China are the Yellow River Valley, the Yangtze Valley and the south-western area. Stoneville 4 is best adapted to the Yellow River Valley and Delfos-531 to the Yangtze Valley; Coker's 100-2 and Foster-6 are best adapted to the south-western region. Two new strains of Delfos-531 (24-424 and 24-1099), produced by pure line selection, have shown superiority over the original material in yield and staple length.

A hybrid strain, "Chicken-foot Delfos," has been obtained which combines the narrow-lobed insect-resistant leaves of "Chicken-foot" and the yielding capacity and qualities of Delfos.

The Yunnan perennial cotton has been found to be related to *Gossypium peruvianum*; this cotton is now grown extensively in Yunnan. An Asiatic cotton of the African type (*G. herbaceum*) has been discovered in Kansu.

In a study of factors determining yield, negative correlation has been observed between number of bolls and the percentage of boll locks.

Growth studies of eight Chinese varieties and 10 American Upland varieties have been carried out at Siuning, Szechuan.

For several years the inheritance of anthocyanin pigmentation in Chinese cotton has been studied. By 1942, another four gene pairs were added to the original total of 14. The genetics of three types of yellowish green seedlings and two types of leaf form occurring in American cotton have been analysed.

Potato

As part of a nation wide potato production programme the following projects are reported: (1) an extensive survey of the important potato growing regions in south and north-western China; (2) the introduction and testing of American varieties and U.S.D.A. hybrids. Out of 52 varieties tested, Red Warba, Sebago, Huma and Chippewa show promise.

Tea

Several hundred seedlings from seed collected from various districts have been selected, some of which are considered promising. Methods of inducing the germination of seeds are under investigation.

Oil plants (*Brassica*)

Research work has begun with a varietal test and study of the effect of selfing. It has been found that the so-called rape in China consists of two distinct groups, viz., Chinese colza (*Brassica campestris*) and mustards (*B. cernua* and *B. juncea*). After selfing the colza does not set seed

freely and shows considerable reduction in vigour, whereas the mustards set seed normally and suffer no loss of vigour.

Tung

Over 500 strains from various parts of China have been collected at the Tung Research Station at Peipeh, Szechuan, as the basis of the breeding programme to be begun in the near future. From data obtained from this collection a system of classification within the species *Aleuritis Fordii* Hemsl. has been worked out. A total of 2000 intervarietal crosses have been effected for breeding purposes and taxonomic investigation.

Mei-tung has proved to be the highest yielding variety among the many varieties cultivated in China.

Soya bean

Hybridization work aims at combining the character of yellow seed-coat with the high yields of certain varieties possessing dark seed-coats.

605. 575:633(67.5)

Rapport pour les exercices 1942 et 1943. (**Report for the years 1942 and 1943**).

Publ. Inst. Agron. Congo Belge 1944 : Hors Sér. Pp. 154.

In addition to the investigations summarized below, yield trials and the introduction of new varieties of several tropical crops are reported, and brief mention is made of selection in wheat, millet, peas and *Pyrethrum*.

Maize

Intervarietal crossing is in progress at Yangambi, to produce a suitable variety of the yellow Plata type.

Single hybrids between open-pollinated selections have been obtained at Gandajika; H (70 x 77) has been distributed for cultivation. Selfed lines of various origin have been produced. The use of these lines in synthetic varieties derived from a mixture of selected double crosses is to be investigated. Several diseases are under investigation. "Crumpy" leaf appears to be a heritable character. The most serious disease is *Sclerospora Maydis* (Rac.) Palm. The hybrid H 37, the pedigree selection 412 and the selfed family 159 have exhibited good resistance to this disease. Native white maize is being selected at Kisosi.

Rice

At Yangambi the aim of selection is the development of early maturing lines giving satisfactory yields of white, long and translucent grain. Lines superior in yield to the standard line R2-14 have been secured from crosses made in 1939 between local and Indian paddy.

Coix Lacryma-Jobi

Selection is to be carried out for high flour yield at Yangambi.

Potato

Blight resistance trials have been conducted at Kisosi, Rubona and Nioka.

Sweet potato

Selection for high yields of tubers and green forage and virus resistance is in progress at Yangambi.

Cotton

At Gandajika selected lines of Triumph, the natural hybrid Triumph x U.4, and U.4 have been obtained. Three families of this material have already been distributed under the designations Gar 33 (99-1062), Gar 157 (134-1200) and Gar 203 (U.4/955); they show marked improvement in quality but not in yield. Selection has also been carried out in the following: Ishan x Bambesa Triumph, Ishan x U.4/H, the back-cross of Bambesa Triumph x Ishan to Triumph, (Bambesa x Ishan) x U.4/H, open pollinated U.4/H, and various introduced lines and varieties. The hybrid Ishan x U.4 has been crossed with introduced varieties such as Stoneville, Deltapine and Lightning Express, and with the most promising station lines. Varietal reaction to *Dysdercus*, which transmits stigmatomycosis, has been studied. It has been found that the insect makes fewer punctures in the rainy season than in the dry season, but that the effect of the punctures in the rainy season is greater. Stoneville 614, 1103 and Big Boll Triumph showed most resistance to the pest, also yielding good quality cotton.

At Bambesa, as in former years, lines derived from Stoneville have shown most promise. The technique of pedigree selection is described in detail. The F_2 of the following crosses show

particular promise: Stoneville x C/55, DPL x H/63, H x DPL, Wilds x DPL, Wilds 5/ x H/63, Foster/6 x H/63 and Stoneville x H/63. A year is gained in hybridization work by the practice, introduced in 1943, of sowing the seeds under irrigated conditions in the dry season so that harvesting can be carried out in July. Varieties and lines have been classified for their reaction to *Fusarium vasinfectum*. *Fusarium*-resistant F₂ plants have been secured from crosses of A-6-211 with 145-C-55, 270-D-64, H.A. 435 and Stoneville 2. Stoneville has proved to be fairly resistant to stigmatomycosis under conditions of artificial infection. A selection has been obtained at Lubarika which is superior to the varieties used at present in the Ruzizi plain.

Urena lobata

At the recently established Gimbi station promising mass-selections have been obtained. To save time the usual method of pedigree selection has been modified; selfing has been eliminated, and hybridization is carried out between impure plants.

At Yangambi selection for high yields of fibre and seed disease resistance is reported.

Cassava

Selection for vegetative vigour, improved yields of starch and flour, and mosaic resistance is being carried out at Yangambi; selection is also reported at Gandajika.

Dioscorea

Selection at Yangambi has as its aim the production of high-yielding early varieties with white flesh and good flavour.

Coffee

Legitimate and illegitimate lines and clones from grafted mother trees have been studied at Yangambi. Illegitimate individual trees have been observed which combine large beans and high yields of green and commercial coffee.

At Mulungu the lines L.B.7, L.B.11 and Miribizi have given the highest cherry yields over a ten year period. The annual variability in productivity shown by *Coffea arabica* is emphasized. It is also pointed out that the production period is short, most trees appearing to be exhausted after 15 years. Lines of local Bronze have shown the most resistance to *Colletotrichum coffeanum*. Varietal differences in resistance to *Antestia*, which carries stigmatomycosis, have been noted.

At Nioka, Bourbon 72, Local Bronze 9, Guatemala 26, and several lines of Mibirizi and Kabare have exhibited most resistance to the "hot and cold" condition.

Cacao

Mother trees of Forastero and Criollo x Forastero hybrids have been selected at Yangambi, and a large number of Criollo x Forastero hybrids are under observation for preliminary selection of mother trees. Data have been obtained on the progeny of Forastero and Criollo x Forastero mother trees. Selection of the latter aims at the combination of high yield and satisfactory qualitative characters of the fruit and bean.

Oil palm

At Yangambi the average yields of the highest yielding lines for the period 1937-43 ranged between 348 to 713 kg. per tree. A large number of bunches were examined in 1943 to discover elite trees to compare lines, and to obtain statistical and genetic data on the external characters of the fruit; the hybridization work carried out to study the fruit genetically has been continued. Preliminary selection of mother-trees is reported in F₂ material.

Cinchona

Clonal and sexual selection is in progress at the Mulungu Station. Artificial hybridization on a large scale is also reported.

Rubber

Data are given on the dimensions and rubber yield of clones and clonal seedlings studied at Yangambi. Legitimate and illegitimate material is under investigation to obtain new clones. Artificial fertilization is also being carried out; the percentage of successful artificial pollinations has ranged between 1 and 4.4.

Groundnut

At Gandajika high-yielding pedigree lines have been derived from mass selections. The line K. 1403/14/400 is particularly high-yielding; it has been named Kigan and is being increased for distribution. Selection in the varieties Gemena 1006 and Yangambi Gemena has been begun.

Certain hybrid lines appear to be promising with regard to yield and oil percentage. The variety Tubeya Ilunga, line 539/62/33/89, has been crossed with Sandoa A.1049. Selection for a red-seeded groundnut producing long slender shells, increased uniform yield, and high oil and protein contents is reported at Yangambi.

Bean

Certain indigenous varieties have shown immunity to *Uromyces appendiculatus* at Gandajika. At Kisosi high-yielding white beaned hybrid forms have been obtained, and named White Kisosi.

Soya bean

Selection for several characters is in progress at Yangambi.

606. 575:633(72.95)

Report of the Federal Experiment Station in Puerto Rico 1944.

Agric. Res. Admin., U.S. Dep. Agric. 1945 : Pp. 44.

Several plant introductions have been made. The following investigations are also reported:—

Bamboo

The moisture content and density of the wood have been studied in several species in relation to susceptibility to the powder-post beetle (*Dinoderus minutus*).

Coffee

The tenth crop was harvested in the experiment comparing the Columnaris variety from Java and the West Indian variety of *Coffea arabica*. The data for the ten harvests indicate that Columnaris gives significantly greater yields than the West Indian variety.

Mangosteen

Seed weight and seedling vigour are correlated.

Insecticides

Observations have been made on strains of *Pachyrhizus erosus*, *P. palmatilobus* and *P. tuberosus* with regard to plant characters and adaptability. Green and mature beans of strains of *Pachyrhizus* spp. have been analysed for rotenone plus rotenoid content.

Derris has shown toxicological superiority to *Lonchocarpus*.

607. 575:633(74.4)

Annual report of the Massachusetts Agricultural Experiment Station for the fiscal year ending November 30, 1941.

Bull. Mass. Agric. Exp. Sta. 1942 : No. 388 : Pp. 108.

Maize

Inbred lines and single hybrids were crossed with Wis. (CC4 x CC8). The crosses are to be tested for early maturity.

Beet

Colour and growth rate appear to be correlated, the larger roots being poorer in colour. Individual and mass selections of Wyman Crosby have been obtained showing considerable uniformity and a compromise of dark colour and medium growth rate.

Tobacco

In breeding for black root rot resistance, selections of Havana Seed which are susceptible to the disease but desirable in type and quality, have been crossed with selections of Havana Seed which are resistant but unsatisfactory in type and quality. Some of the hybrid selections show promising resistance, improved type and earlier maturity. A number are also superior to either parent in leaf shape and size of veins. Selections of Havana 211 have also been studied.

Apple

Bud sports of McIntosh are being maintained to determine the colour type of the fruit produced. Most of the selections are known to be non-striped strains.

Peach

The genetics of blossom characters have been studied. Blossom type is controlled by one gene pair, designated *Sh sh*, the non-showy type being dominant. One or more gene pairs determine blossom size.

Cranberry

Hybrid strains are under test for resistance to false blossom.

Carrot

Promising lines have been produced from a cross between Hutchinson and a Turkish red carrot, which have a uniformly coloured root and an attractive external colour darker than that of Hutchinson.

Onion

Hybrids between *Allium fistulosum* and *A. Cepa* have been secured. Some of the hybrids are to be treated with colchicine. An early maturing strain of Ebenezer (*A. Cepa*) has been obtained.

Asparagus

Previous selections have been further tested. The yield of the best strain was double that of the lowest yielding strain and of the commercial seed, but considerable variation was observed within a strain. New selections are to be made to secure more uniformity in several characters.

Broccoli

Crosses have been made between widely different types of green sprouting broccoli. F_1 hybrids between homozygous parents and hybrids in which one or both parents were commercial strains have shown marked differences in uniformity.

Rutabaga

The following three types have been selected: No. 1, with white flesh, white or light green shoulder, and a uniformly coloured root, No. 2, with white flesh and a purplish shoulder, and No. 3 with yellow flesh but otherwise resembling No. 2.

Lettuce

Promising selections have been obtained from the F_3 of a cross between Bel-May and Cheshunt Giant. The hybrids are dark green in colour and their leaves overlap closely at the stalk base. The hybrids also bolt less readily.

Tip-burn resistant selections have been secured.

Celery

Single plant selections have been tested for heart burn resistance. The least susceptible strains showed only 25% heart burn. Light and heat treatment have not materially hastened flower stalk development.

Cucumber

Some hybrids have been outstanding in yield. Methods of pollination and the effect of homozygosity on fruit setting are under investigation. Approximately 40% of the self-pollinated flowers set fruit.

Tomato

Lycopersicon pimpinellifolium, *L. hirsutum*, and the varieties Bay State, Globelle and Vetomold, derived from crosses between *L. pimpinellifolium* and *L. esculentum*, have shown susceptibility to a new physiological form of *Cladosporium* leaf mould. Both *L. pimpinellifolium* and *L. hirsutum* are highly resistant to the common race.

Breeding work is being carried out to introduce the character of uniform ripening into otherwise desirable varieties. This character behaves as a single recessive. Selections with indeterminate plant habit have been found to be more satisfactory than determinate selections, since they provide more leaf shade for the fruit.

Trellis No. 22 has been crossed with Comet, Victor and other varieties to improve its fruit quality.

The extent of hybrid vigour, as shown by yield, was approximately the same in the F_1 and F_2 generations of the cross Waltham Forcing x Early Rutgers.

Work on greenhouse tomatoes has included trials of F_1 hybrids to determine the combining ability of certain varieties with Waltham Forcing and Bay State. The F_2 of a cross between Waltham Forcing and Michigan State Forcing was also studied; the yield was considerable but lacked uniformity. Tall, unfruitful plants have often been observed in Waltham Forcing. It has been discovered that such plants are only partially sterile. Their use as mother plants is suggested in the production of F_1 hybrid seed.

Sweet corn

Early disease resistant inbreds giving high yields of good quality have been produced. Several hybrid combinations of these lines are recommended for further trial.

608.

575:633(74.4)

**Annual report of the Massachusetts Agricultural Experiment Station
for the fiscal year ending November 30, 1942.**

Bull. Mass. Agric. Exp. Sta. 1943 : No. 398 : Pp. 64.

Tobacco

The work of producing desirable strains of Havana Seed resistant to black root rot has been continued. In small plot trials two strains have shown promising resistance, good general type and quality, and well-shaped leaves with small veins, and have matured as early as the common Havana Seed parent.

Raspberry

The nature of winter hardiness has been studied. Indication has been obtained that the most susceptible varieties are those having very short dormancy periods.

Blueberry

Varietal differences in cold resistance have been noted.

Onion

Spacing trials are reported. The inheritance of number of seed stalks per plant is being studied. Hybrids of *Allium fistulosum* x *A. Cepa* exhibit the character of producing several bulblets, each bulblet bearing a flower stalk. Hybrids of *A. fistulosum* and *A. Cepa* have been subjected to colchicine treatment.

Asparagus

Selected strains give 60% higher yields than in 1942.

Rutabaga

Types Nos 1 and 3 (cf. Abst. 607 above) are recommended for distribution.

Tomato

Certain types of tomato and several selections of *L. peruvianum* have been found which are highly resistant or immune to both the common and new physiological races of *Cladosporium*. Preliminary trials for resistance to *Alternaria Solani* have been conducted.

F₂ hybrids from crosses of Trellis No. 22 with other varieties have been back-crossed to Trellis No. 22 or crossed with Denmark to obtain early maturing selections. F₁ hybrids of different varieties with Trellis No. 22 have been tested. Trellis No. 22 x Maine No. 85, the most productive hybrid, yielded 44% more early fruit and 11% greater total yields than Trellis No. 22.

609.

575:633(74.7)

**Fifty-seventh Annual Report of Cornell University Agricultural
Experiment Station 1944 : Pp. 188.**

Wheat

The behaviour of *Triticum Timopheevi* in various crosses is under observation. Additional crosses have been made between wheat and rye. From two of these, some partially fertile F₁ plants were secured. The progeny exhibited varying degrees of sterility, but some plants were fairly fertile and showed certain characteristics of rye.

Limited data indicate that hybrid selections grading high or low in vitamin B₁ tend to show a similar grading in the following generation.

Crosses have been made between the rust resistant variety Victoria and susceptible varieties.

Oats

A study is in progress on the inheritance of tillering capacity, and the relation between this character and height. *Avena gigantea* was used as parent in various crosses.

Promising smut resistant hybrid selections are under test.

Maize

An investigation of the inheritance of the number of kernel rows per ear is in progress. Several 12-row types have different genes, and it has been possible to produce types with 22 kernel rows by multiple crosses of inbreds with 12 rows. Various 8- and 12-row types differ in relative dominance.

The work of breeding maize for silage and grain is reported. A new grain hybrid, Cornell 35-5, has been produced.

Barley

The genetics of mildew resistance, stiffness of straw and various characters of the spike are being studied. Crosses are reported between winter and spring barleys, to determine the mode of inheritance of the unusually stiff straw of the Wong winter barley, in the attempt to transfer this characteristic to spring barley; earlier studies have, however, indicated that straw stiffness tends to be associated with the winter type.

Red Clover

Tetraploids have shown no superiority in vigour and disease resistance over diploid plants.

Potato

Superior strains have been obtained by crossing several varieties with the pollen producing varieties such as Katahdin and Earlane, and back-crossing the selections to Katahdin and Earlane.

Colchicine treatment has produced several tetraploid plants of some of the wild species. Hybrids between tetraploids of *Solanum chacoense* and commercial varieties are now available, and are being back-crossed to Katahdin and Earlane.

Several hybrids have been obtained which have shown blight resistance and good commercial qualities.

Rubber plants

Tetraploids of milkweed and *Cryptostegia* have been studied. Tetraploids of the latter were only slightly higher in rubber and resin contents than the diploids. No analytical data of the milkweed tetraploids are available.

Celery

In breeding for blight resistance, Golden Self Blanching, a variety susceptible to blight and yellows, has been crossed with the so-called wild celery, resistant to both diseases. An F_2 plant showed blight resistance and was also fairly edible. Promising edible selections exhibiting resistance to both blight and yellows have been obtained from a cross between this plant and the yellows resistant, self-blanching variety Cornell 19.

Musk-melon

The Cornell selection No. 36 resistant to *Fusarium* wilt has been named Iroquois and commercially released.

Cucumber

Mosaic resistant selections have been obtained by back-crossing the progeny of crosses between mosaic resistant strains and susceptible ones to the susceptible parents.

Beans

Progenies homozygous for mosaic resistance which are also desirable types of pea bean have been derived from a cross between the mosaic resistant Great Northern and Michelite.

Two varieties of field beans exhibiting outstanding resistance to bacterial blight have been crossed with White Kidney and three varieties of green beans.

610.

Farm science in war and peace.

65th Rep. N.J. Agric. Exp. Sta. 1943-44 : Pp. 64.

575:633(74.9)

Maize

Inbred lines and single cross hybrids have been studied for borer resistance. Inbred A47 shows considerable resistance, and transmits the character to the New Jersey hybrids, 2, 4 and 5. N.J. Hybrid No. 5 exhibits marked resistance to the entrance of the borers, but is damaged more severely than Nos 2 and 4 once entrance has occurred.

Lucerne

Atlantic has consistently outyielded the standard varieties in trials during the last five years.

Peach and Nectarine

Nearly 30 new crosses of peach have been effected. Promising yellow-fleshed and white-fleshed seedlings have been produced. Progress is being made in breeding two yellow-fleshed commercial varieties which are respectively earlier and later ripening than Elberta. Studies of varieties resistant to cold have been made, using a method of artificial freezing the dormant fruit bud.

New nectarine crosses are reported.

Blueberry

Selection work is in progress.

Strawberry

Ten selections which show promising vigour, yield and flavour, are to be further tested, and the best are to be named. Improved selections of everbearing strawberries have been secured.

Asparagus

A high yielding strain has been developed as the result of hybridization and selection for ten years.

Soya bean

The effect of row-spacing upon yield, maturity and lodging has been analysed in the varieties Granger and Chief.

Sweet corn

Inbreds have been tested for wilt resistance. New hybrids are under observation for several characters. The practicability of producing local hybrid seed is under investigation.

611

575:633(75.1)

Annual report of the Director for the fiscal year ending June 30, 1943.

Bull. Del. Agric. Exp. Sta. 1943 : No. 244 : Pp. 44.

Wheat

Selections giving higher yields than the three leading commercial varieties have been secured.

Maize

The study of the susceptibility of hybrids to *Helminthosporium* and bacterial leaf blights is in progress.

Forage grasses

Strains of ten species are under test, particular attention being paid to drought resistance.

Clover

Native white clover strains appear to be hardier than certain commercial varieties.

Fruit trees

Comparative data on several flower and fruit characters, including the time of blooming, have been collected from nearly 70 varieties of apple and peach. Varietal data on cold injury to fruit buds have been obtained in apple, peach and cherry.

Considerable variation was found in the size and form of the pollen grains of different peach varieties. Malformation of the grains is no index to germinability of the grains or vigour of the pollen tubes.

Strawberry

The production of commercial varieties resistant to red core is in progress.

Summer squash

Spacing trials have been carried out.

Tomato

The number of days between the fully opened flowers and ripe fruit was determined in the varieties Rutgers, Early Baltimore, Pan-American and Stokesdale.

Spacing trials are reported. The size of fruit was not reduced by close spacing. Yield per acre increased with decreased spacing.

Soya bean

Varieties have varied considerably in susceptibility to downy mildew, and to *Cercospora* sp. causing a purple stain in the pods.

612.

575:633(75.1)

Annual Report of the Director for the fiscal year ending June 30, 1944.

Bull. Del. Agric. Exp. Sta. 1944 : No. 251 : Pp. 46.

Wheat

High-yielding selections have maintained their promise.

Maize

In tests for reaction to borer attack certain hybrids were resistant Under conditions of severe borer infestation hybrids have outyielded open-pollinated varieties.

Forage grasses

Reed canary grass, smooth brome grass, tall fescue and orchard grass have exhibited the greatest resistance to drought, in the order named.

Peach

The varietal study of the time of blooming and ripening period is now complete.

Strawberry

In the work of breeding for red core resistance, several Delaware selections are giving promising results.

Tomato

The results of spacing trials confirm those of the experiments in 1942.

613. SCHAUB, I. O. and
BAVER, L. D.

575:633(75.6)

Research and farming.

67th Rep. N.C. Agric. Exp. Sta. 1944 : 3 : Progr. Rep. No. 4 : Pp. 111.

Wheat

High-yielding mildew and leaf rust resistant selections have been produced from the cross Frondosa x (Redhart x Noll). Strains of Malakoff x Nittany have given high yields in tests for several years; they have also shown rust resistance and some mildew resistance. Strain 3 of Malakoff x Nittany possesses a wide range of adaptation, and will probably be used extensively in the breeding programmes of several south-eastern states.

Oats

A promising new winter-hardy selection has been developed from the cross Winter Fulghum x Lee. It has outyielded the standard variety, Lee 5, by 15% in a six-year period. It is susceptible to crown rust, and only resistant to certain races of smut.

Selections of the cross Letoria x Fulwin have exhibited resistance to mosaic.

Maize

Differences in resistance to earworm and grain weevil attack have been observed among inbreds and hybrids.

Barley

Sunrise has shown some resistance to aphid.

Mildew resistant selections of the crosses Sunrise x Hooded 26, Sunrise x Hooded 16 and Sunrise x Davidson are under test. Several have outyielded Sunrise.

Clover

Strains of crimson clover which had shown a tendency to produce hard seeds were allowed to "volunteer" without re-seeding. The new variety, Dixie, has been produced from a mixture of three of these strains whose germination was sufficiently delayed to result in satisfactory stands.

Sweet potato

Over 20 varieties have been analysed for vitamin content. Varietal differences in carotene were particularly marked; varietal differences in vitamin C were not so extreme. The red or yellow fleshed varieties are good sources of carotene, whereas the white-fleshed forms contain only small amounts.

Tobacco

Oxford 26 is a new wilt resistant variety obtained from the introduction 448A x 400. It gives satisfactory yields, and is suitable for cigarette manufacture.

Dewberry

Some selections have shown drought resistance.

Collard

The collard has been found to be a rich source of vitamins. Data are given on the ascorbic acid, riboflavin and carotene contents of nine varieties.

Cucumber

Varietal tests of pickling quality are reported.

Tomato

Complete resistance to bacterial wilt (*Bacterium Solanacearum*) has been shown by three lines selected for wilt resistance. One of these lines is the F₅ from the cross Louisiana Pink x T414 (*Lycopersicon esculentum* from Porto Rico—P.I. No. 3814).

614. DORMAN, C. 575:633(76.2)

Highlights of the work of the Mississippi Experiment Station.

56th Rep. Dir. Miss. Agric. Exp. Sta. 1943 : Pp. 54.

Forage crops

Selection, hybridization, and strain and progeny tests are in progress in winter pea, vetch, crimson clover, Dallis grass, Johnson grass, *Paspalum* hybrids, and hybrids between Johnson grass and sorghum.

Turnip greens

The effect of different factors upon vitamin and mineral contents has been studied in two varieties. Variety was found to have no effect upon vitamin C or the iron content.

Cotton

The high-yielding strain Delfos 651 is to be released. Another high yielding Delfos strain is under test. The strain of Deltatype Webber, designated 2139, has shown promise in several characters.

Apple and Pear

Observations on varieties for the occurrence of fire blight have been made.

Cucumber

Hybridization and inbreeding are reported.

Tomato

Promising F₆ and F₇ hybrids have been obtained.

Bean

Selection work in bush and pole beans is reported. Mississippi 18 is being selected for mosaic resistance.

615. 575:633(76.3)

Progress through agricultural research, Louisiana 1942-1943.

Rep. La Agric. Exp. Sta. 1943 : Pp. 142.

Potato

Breeding for higher dry weight, vitamin C content, and yellow flesh colour denoting high vitamin A content is in progress.

The seedling TK-3-39-14, derived from the cross Triumph x Katahdin, has been named DeSota. It is a high-yielding mid-season variety. A seedling from a cross between Chippewa and an inbred line of Triumph has been named La Salle; it matures slightly earlier than DeSota. Both new varieties outyield Triumph and show considerable mosaic resistance.

Sweet potato

Selection and hybridization are in progress. Two promising seedlings, 1 x 6-39-10 and 1 x 42-39-3, are being increased; 1 x 6-39-10 is suitable for dehydration and canning purposes, and in northern Louisiana its yield is equal or superior to that of Porto Rico Unit 1; 1 x 42-39-3 gives good yields of uniformly shaped tubers. Both seedlings give higher percentages of grade No. 1 tubers than Porto Rico Unit 1, and have a deeper yellow colour due to higher carotene content. The genetics of flesh colour and wilt resistance are under investigation.

Cotton

A selection from a cross between Miller and Deltapine 2 shows satisfactory staple length and uniformity, excellent lint percentage and fairly good boll size; it has so far given good yields. Tidewater and an unnamed variety have been crossed in an attempt to produce a long stapled cotton with improved yield. Promising hybrid lines have been secured. Selection from crosses between Hopi, a very short staple variety, and several Upland varieties is in progress. Selections of the hybrid D. and P.L. 829 and Dixie Triumph 425-920 show improvements in wilt resistance and other characters.

Sugar cane

The new varieties, C.P. 33-310 and C.P. 33-425, have been released for commercial planting; they exhibit local adaptability to certain soil types.

Tung

Selection work is reported.

Onion

Seedlings obtained from crosses between strain C-5 of Creole and promising selections of C-5 have given yields twice as high as Creole. Their dry matter content, however, is not as high and their keeping quality is therefore not equal to that of Creole.

Cabbage and Collard

Selection for a pure line with a compact head and short core has been carried out in the Louisiana Allyear cabbage variety derived from the cross (Louisiana Copenhagen x Marion Market) x Charleston Wakefield. Selection in Louisiana sweet collard for uniform plants with darker leaf colour has been continued.

Water-melon

At the Hammond substation hybrid selections have been obtained combining disease resistance and desirable fruit qualities.

Tomato

Breeding for high dry matter and vitamin C content and wilt resistance is in progress. A selection from a cross between Louisiana Slicer and Marglobe gave a promisingly high vitamin C content.

Okra

A varietal study on ascorbic acid content is reported.

Peas

The breeding of edible cowpeas showing resistance to *Fusarium* wilt and the root knot nematode and other desirable characters is reported at the Hammond substation.

A promising garden pea selection, G 1-2, derived from a cross between Creole and Thomas Laxton, is being increased.

616.

575:633(76.3)

Research in agriculture, Louisiana 1943-1944.

Rep. La Agric. Exp. Sta. 1944 : Pp. 179.

Rice

A new early maturing variety, Magnolia, is to be released. It exhibits resistance to races 1 to 4 of *Cercospora Oryzae* and some resistance to white tip. A medium early selection from a cross between Iola and Blue Rose also shows resistance to races 1 to 4; in addition it is highly resistant to white tip. Rexoro, which has hitherto been resistant to all main races of *C. Oryzae*, has shown susceptibility to a new physiological form.

Dallis grass

Selection has resulted in increased seed yields, but it has been found that high total seed yield is not necessarily associated with increased viability. Preliminary studies in pollination indicate that natural crossing does not exceed 2%.

Potato

Marked differences in resistance to leaf-roll virus have been shown by varieties and seedings. A genetically controlled type of leaf roll has been observed.

Sweet potato

Promising seedlings have been analysed for ascorbic acid and vitamin A content. L-126 has been named Queen Mary and L-12 Ranger. These seedlings have a higher vitamin A content than Porto Rico Unit 1.

Data from crosses between starch varieties resistant to *Fusarium* wilt and susceptible table varieties indicate that resistance is a recessive character conditioned by more than one gene. F₂ hybrids between yellow-fleshed and white-fleshed varieties are to be grown for analysis of flesh colour inheritance.

Tests of varieties, introductions and hybrid selections for resistance to wilt or stem rot (*Fusarium* spp.), soil rot (*Actinomyces Ipomoea*) and black rot [*Endoconidiphora* (*Cerastomella*) *fimbriata*] are

in progress. In breeding for wilt resistance the seedling L 4-5 is particularly valuable since it combines considerable resistance, high yield and starch content.

Cotton

Selection for improved boll size in the progenies Stoneville x Hopi is reported; certain of these progenies appear to have some resistance to *Verticillium* wilt. D. and P.L. x Dixie Triumph progenies exhibit improved staple length, and less than 5% wilt under conditions of severe infection.

Sugar cane

Among the unreleased varieties under test C.P. 36-13, C.P. 36-19, C.P. 36-105 and C.P. 36-183 are outstanding.

Pepper

At the Hammond substation a selection from a cross between California Wonder and Corneli Special has been named Dixie Wonder. The characteristics of pendant fruit and abundant foliage prevent damage to the young fruit through exposure to the sun.

Pumpkin

The new variety Longfellow has been developed from a cross between the African squash (*Cucurbita Pepo*) and the cushaw (*C. moschata*). It is superior to the African squash in vigour and adaptability and also shows improvements over the cushaw. Longfellow provides two crops a year, stores well and can be used for a variety of purposes.

Okra

The new variety Louisiana Market has been released. It has short thick pods, and is light green in colour. The marketable pods are two to four inches long. The plant branches sparsely and is medium tall to tall in height.

Cowpea

At the North Louisiana Experiment Station promising hybrids resistant to both wilt and nematodes have been produced.

617. McDOWELL, C. H.

575:633(76.4)

Research serves agriculture.

57th Rep. Tex. Agric. Exp. Sta. 1944 : Pp. 49.

Cereals

The production of rust resistant varieties of wheat, oats and barley is in progress.

Sorghum

Further new dwarf grain varieties for combine harvesting are being developed by hybridization. Dwarf and double dwarf strains of Shalla, a double dwarf variety with waxy endosperm suitable for the manufacture of tapioca and free from undesirable pigments, and a double dwarf white-seeded variety for use in starch production, are mentioned as being among the promising new varieties.

Forage grasses

The new variety, Sweet Sudan grass, has been developed by crossing Leoti sorgho and Sudan grass, and back-crossing to the latter parent. It combines the juicy, sweet stems, non-shattering seed, disease resistance and sienna glume colour of the Leoti sorgho with the grassy characters of Sudan grass. Sweet Sudan grass produces more seed and forage of better quality than the common Sudan grass, but is slightly later maturing. Its disease resistance enables it to provide green grazing several weeks later in autumn than does Sudan grass. The sweet form is also more chinch bug resistant. The sienna glume colour is valuable in the detection of impure seed. Rhodes grass is being selected for winter hardiness.

Flax

The breeding of rust resistant varieties is receiving attention.

Oil plants

Three native perennial weeds, viz. horsemint (*Monarda fistulosa*), mintweed (*Pycnanthemum albescent*), and Goldenrod (*Solidago odora*), are considered to be valuable as sources of oil. Goldenrod contains 2.8% oil, and has yielded 9.5 tons of oil per acre in the second year of growth.

Rubus

Promising F_5 seedlings have been obtained from a cross between the nessberry and the wild dewberry. R 40-4 and R 40-51 are suitable for the home garden. R 40-4 ripens in the period between the strawberry crop and the time during which present varieties of blackberry and dewberry ripen. It produces high yields of good-sized fruit. R 40-51 is distinguished by particularly large fruit. R 40-202 may be of value as a commercial variety, and it is high yielding and stands handling.

Onion

A superior strain of Early Grano, named Texas Grano, is to be released. It is high yielding, and is earlier and shows more uniformity in maturity than Early Grano.

Cantaloupe

A new variety, named Texas Resistant Cantaloupe No. 1, has been obtained from a cross between a West Indian cantaloupe and an improved strain of Hale's Best. It possesses the resistance to downy mildew and aphid attack shown by the West Indian parent. The new cantaloupe is early maturing, and small in size with a firm rind, moderate retting, orange flesh and good flavour.

618.

575:633(76.8)

Fifty-fifth Annual Report of the Agricultural Experiment Station of the University of Tennessee, for 1942 : Pp. 111.

Wheat

Selections of crosses between rust resistant varieties and locally adapted wheats have exhibited resistance to both leaf and stem rust, or to at least one rust.

Oats

Preliminary data indicate that high yielding strains can be obtained by crossing Victoria with the winter-hardy Tennessee varieties, 090, Fulwin, Tennex and Forkedeer.

Maize

Inbred lines of Jellicorse, Jarvis and Yellow Paymaster selected for three or four generations were tested in top-crosses at various locations. Some of these lines were promising with regard to yield per acre, husk protection and resistance to lodging. The breeding of yellow hybrids is receiving increased attention.

Barley

A smooth awned selection (7B2-42) of the cross Lion x No. 52 has been named Jackson No. 1. It is earlier than Jackson and gives promise of being higher yielding; it is also better adapted to fertile soils.

Red clover

Breeding for uniform seed colour, plant appearance and resistance to powdery mildew and anthracnose has been continued.

Forage grasses

High yielding strains of smooth brome grass and giant meadow fescue have been obtained. Promising ley and pasture types of perennial and Italian ryegrass have also been isolated.

Cotton

Hybrid selections from crosses of resistant varieties with susceptible varieties and single plant progenies of selfed cottons are being studied for resistance to *Fusarium* wilt. The cross between 8-66 and 15-612, two inbred lines of Stoneville distinguished by their strength and fineness, has given promising progeny.

Tobacco

F_3 , F_4 and F_2 lines of crosses of mosaic resistant lines on dark tobacco were inoculated in the field with green and burning mosaic viruses. Some of the lines showing promising resistance were selfed for the next season's studies; others were back-crossed on the Medole variety of dark tobacco.

In the programme of breeding dark tobaccos resistant to black shank, further crosses have been made between resistant strains and Medole.

Pear

Hybridization and selection are in progress to obtain fire blight resistant seedlings.

Raspberry

Work has been begun on black raspberry breeding in addition to the breeding of red types.

Strawberry

Crosses involving Fairfax as one parent have yielded seedlings with fruits of good flavour and quality. Missionary has proved to be a valuable parent, and is one parent in the three new varieties recently distributed, viz., Tennessee Supreme, Tennessee Shipper and Tennessee Beauty. Tennessee Beauty was named in 1942; it is a firm-fleshed mid-season cropper.

Breeding and selection for resistance to black root are in progress.

Rhubarb

A search is being made for resistance to crown rot (*Phytophthora parasitica*), which is a serious disease at low elevations in Tennessee. Among a wide range of varieties and strains, none has so far shown resistance to the disease.

Water-melon

Some hybrids between standard varieties and varieties resistant to *Fusarium* wilt have shown promising resistance to wilt in the F₂.

Tomato

In tests of the resistance of seedlings to *Alternaria* leaf spot only the wild species, *Lycopersicum hirsutum* was highly resistant.

Beans

Promising selections have been derived from the cross Asgrow Stringless Green Pod (*Phaseolus vulgaris*) ♀ x Urd (*P. Mungo*) ♂, one of which exhibited anthracnose resistance. Other crosses have been made to combine resistance to root-rot and nematode. The rice bean (*P. calcaratus*) has been grown as a possible parent in breeding work. A large podded strain has been isolated. A strain of P.I. 117232 scored second to Tender Pod in processing trials and is being used for breeding.

Sweet corn

The reaction of inbreds and hybrids to bacterial wilt has been studied.

Pyrethrum

Clonal selection is reported.

619.

575:633(76.8)

Fifty-sixth Annual Report of the Agricultural Experiment Station of the University of Tennessee for 1943: Pp. 115.

Wheat

Lines resistant to both stem and leaf rust have been obtained.

Oats

The selection 140-17-63-75 of the cross 090 x Bond gives promise as an early winter-hardy variety possessing the smut and rust resistance of Bond.

Barley

F₃ progenies of Polders crossed with Tennessee strains have exhibited marked resistance to lodging in comparison with the parental Tennessee barleys.

Forage grasses

Superior strains of smooth brome grass, orchard grass, perennial ryegrass and giant meadow fescue are being increased for further trial.

Red clover

Breeding for uniform seed colour, plant appearance, and resistance to powdery mildew and anthracnose has been continued.

Sweet potato

Dehydration tests of 16 varieties have been carried out. The following varieties were found to be suitable for dehydration: Yellow Strasburg, Nancy Hall (selections 11 and 103), U.S. 47442, Nancy Gold and Bunch Porto Rico.

Cotton

Pure lines are being developed of *Fusarium* wilt resistant selections derived from simple and multiple crosses. Numerous inbred lines are under test in comparison with commercial

open-pollinated varieties; the most promising lines will be combined to obtain the maximum superiority over the open-pollinated varieties.

Tobacco

Progress has been achieved in the development of mosaic resistant dark tobaccos approaching the variety Medole. Crosses have been made between six black shank resistant varieties and Medole.

Pear

A considerable number of seedlings showing various degrees of resistance to fire blight have been obtained.

Raspberry

Indigenous black raspberries are being selected for disease resistance. Use will be made of these selections, introduced species and commercial varieties in breeding.

Blackberry

A collection of commercial, native and exotic varieties has been grown. A breeding programme to improve fruit quality, productiveness and disease resistance is to be initiated in 1944.

Strawberry

Out of a total 185 progenies of crosses between promising Tennessee selections, 41 were selected for further trial.

Rhubarb

Selections from the higher elevations in Tennessee show tolerance to crown rot (*Phytophthora parasitica*), whereas the 60 varieties collected from various parts of the world have died after one to six years in the test grounds.

Water-melon

A water-melon resistant to *Fusarium* wilt and of high quality has been developed.

Tomato

Lines immune to *Fusarium* wilt have been produced from crosses between commercial varieties and the wilt immune cherry tomato.

Beans

Species from various sources have been tested for disease resistance; the most promising are to be used in crosses with *Phaseolus vulgaris*. Hybrids between Asgrow Stringless Greenpod and the Mexican bean beetle resistant Urd (*P. Mungo*) have been back-crossed to Asgrow Stringless Greenpod.

Pyrethrum

Clonal selection has been continued.

620.

575:633(77.5)

What's new in farm science.

59th Rep. Dir. Wisc. Agric. Exp. Sta. 1942 (1943) : Pt 2 : Bull. No. 460 : Pp. 87.

Potato

Several varieties have been classified for resistance to yellow dwarf disease. Sebago has shown most resistance to yellow dwarf, and also resistance to "sprain" or internal brown spotting. Indication has been obtained that resistance to hopperburn tends to be a dominant character.

Pine

Selected trees of the native white pine (*Pinus Strobus* L.) have proved to be resistant to blister rust.

Soya bean

Mandarin No. 507, an early maturing variety, and the medium early Manchu 606, were released in 1942 as suitable varieties for grain production. Still earlier maturing strains, some of which ripen two weeks earlier than Mandarin 507, are under observation.

Mendota is a new high yielding vegetable variety due to be released in 1943.

Pea

Canning strains showing 50% resistance to near-wilt have been secured.

It is hoped to develop a new late maturing variety from a cross between Prince of Wales and Wisconsin Perfection, and a new mid-season variety from a cross between Director and Wisconsin Perfection. Early maturing lines of Scotch peas and strains which appear to be suited to quick

freezing are under observation. Mention is also made of a new early sweet canning variety with a more desirable vine type than is usually possessed by this kind of pea. All these promising canning varieties are wilt resistant but susceptible to near-wilt.

621.

575:633(77.5)

What's new in farm science.

60th Rep. Dir. Wisc. Agric. Exp. Sta. 1943 (1944) : Pt 2 : Bull. No. 463 : Pp. 80.

Wheat

Henry is a new, high yielding variety of spring wheat derived from the cross (Illinois No. 1 x Hope) x (Webster x Resaca). It is a bearded wheat with large kernels and moderately stiff straw, and it is resistant to all the common diseases. It has the defect of false black chaff or brown necrosis, inherited from Hope. Henry is primarily a fodder wheat but has shown fairly satisfactory baking quality.

Forage grasses

Breeding work aims at the development of strains of Kentucky bluegrass, smooth brome grass and Sudan grass which are resistant to several bacterial and fungus diseases.

Egg plant

The new variety Badger State has been produced from a cross between Black Beauty and Black Bountiful. It is earlier maturing than Black Beauty. The fruits are light purple, symmetrically elongated, and six to seven inches in length.

Pea

A new early maturing sweet canning variety, named Early Badger, has been released. The varieties Perfection, Horsford and Nott's Excelsior, were involved in its parentage. Early Badger is distinguished by a determinate growth habit. It is resistant to *Fusarium* wilt, and fairly resistant to heat and drought. In addition it has good canning quality, and equals Perfection in yield.

622.

575:633(77.5)

What's new in farm science.

61st Rep. Dir. Wisc. Agric. Exp. Sta. 1944 (1945) : Pt 2 : Bull. No. 466 : Pp. 63.

Wheat

A new high-yielding winter wheat has been developed, named Blackhawk. It originated from a cross between a selection of Fultz and the Minturki variety. Blackhawk is a bearded wheat with white chaff and soft or semi-soft red kernels. It is suitable as a fodder crop and also for baking and milling. Its resistance to leaf rust and bunt is good. It offers an intermediate degree of resistance to loose smut and some resistance to stem rust.

Maize

A new early hybrid strain, No. 275-A, is to be released, which produces higher yield than No. 275, and is more resistant to lodging. It has medium-sized ears with deep kernels and a very small cob, giving a shelling percentage of 85-6.

Garden beet

Varietal differences in resistance to the internal black spot disease, which is caused by boron deficiency, have been observed. Long Dark Blood has shown no sign of black spot, and it is suggested that this variety may be a valuable parent in breeding. Asgrow Canner is considerably more resistant than Perfected Detroit and Detroit Dark Red.

Apple

It has been found that the floral structure of Delicious is such that honey bees do not readily pollinate it. In 80% of their visits, the nectar was extracted without effecting pollination.

Pine

Grafts from selected trees of the native white pine (*Pinus Strobus* L.) have shown more resistance to blister rust than commercial seedlings. Seedlings from the selected trees, however, have not exhibited more resistance than the commercial seedlings. The large scale propagation of rust resistant pines is under investigation.

Cabbage

The new variety, Improved Wisconsin All Seasons, is to be released. It combines high vitamin C content, complete resistance to yellows, and a high degree of resistance to mosaic.

The Wisconsin Ballhead cabbage has been improved, and a new line known as Improved Wisconsin Ballhead is due for release. It shows improvement in yield, type, uniformity and colour. Like other varieties recently produced at the Wisconsin Station it is yellows resistant.

Pea

The breeding of varieties resistant to *Fusarium* wilt and near-wilt is in progress. Recently it has been found that resistance to near-wilt depends upon a single dominant gene.

623.

575:633(78.3)

Agricultural research in South Dakota.

56th Rep. S. Dak. Agric. Exp. Sta. 1942-43 : Pp. 58.

Wheat

Two promising high-yielding early strains are being increased for possible commercial distribution.

Oats

An introduced strain derived from a cross between Victoria and Richland has been named Vikota (C.I. 3602) and released.

Maize

Hybrid production is reported.

Sorghum

Selections with a lower hydrocyanic acid content than 39-30-S have been obtained.

Forage grasses

Selection in *Agropyron intermedium* and smooth brome grass has been carried out.

Lucerne

The new variety Ranger exhibits superiority in yield, bacterial wilt resistance and hardiness over the standard varieties.

Apple

The breeding of triploids is reported, with the object of producing apples with higher vitamin C content.

Tomato

In the breeding work to develop an early drought resistant variety of high quality, promising material has been secured.

Soya bean

Over 200 new crosses have been made.

Sweet corn

Inbred and hybrid lines are under test for tolerance to heat. Observations are being made on reaction to smut.

624.

575:633(78.3)

Agricultural research in South Dakota.

57th Rep. S. Dak. Agric. Exp. Sta. 1943-44 : Pp. 48.

Small-grain cereals

A breeding programme is in progress to develop early rust resistant varieties of wheat, oats, barley and rye.

Two lines of wheat, Rival x Thatcher (Nos 2280 and 2259) and three lines of barley, Peatland x Vaughn (Nos 317 and 391) and Peatland x Dryland (No. 252) are being increased for commercial distribution.

Maize

Hybrid production is reported.

Sorghum

Breeding in forage and grain sorghum for low hydrocyanic content, earliness and other desirable qualities has been continued.

Forage grasses

Promising results have been obtained in selecting crested wheat grass for resistance to root rot under drought conditions and smooth brome grass for blight resistance.

Apple

The new dessert variety, South Dakota Golden, has been introduced. It was developed from a cross between Grimes Golden and Duchess of Oldenburg. The fruit is a clear light golden yellow colour, ripening to nearly white.

Apricot

The new variety Harbin, derived from seed from Northern Manchuria, has been commercially released. It is notable for its large fruit.

Cherry

Two new bush cherry varieties have been introduced. South Dakota Amber has been selected from the local *Prunus Besseyi*. South Dakota No. 155 is a green-fleshed type, resembling Opata.

Tomato

Hybrids involving commercial and wild forms are being selected for leaf spot resistance. Vitamin C content in the currant tomato and F_1 crosses between this species and standard commercial varieties has been higher than in the standard varieties.

Soya bean

Further selection and hybridization have been carried out.

Sweet corn

In the breeding programme for drought resistance, inbred lines have segregated for tolerance to high temperature under artificial and field conditions. Certain of these lines possess other desirable characters, including a fair degree of smut resistance.

625. 575:633(78.7)
Fifty-second annual report of the University of Wyoming Agricultural Experiment Station 1941-1942 : Pp. 60.

Work on agricultural crops has consisted mainly of varietal trials. Selection in potato for resistance to scab and psyllid yellows is reported.

626. 575:633(78.8)
Director's Annual Report for the fifty-seventh fiscal year 1943-44.
 Ann. Rep. Colo. Agric. Exp. Sta. 1943-44 : Pp. 43.

Barley

Tests for varietal resistance to smut are reported.

Potato

Some resistance to psyllid injury has been shown by 18 seedlings, which are to be further tested. New seedlings and hybrids have been tested for resistance to scab, *Fusarium* wilt and virus diseases. Promising scab-resistant lines have been secured.

Vegetables

Onion lines have been tested for thrips resistance. Selection for resistance to pink root has been begun. Tests indicate that Mountain Danvers is satisfactory for dehydration purposes, but that the Sweet Spanish variety is unsuitable.

Seed production tests on onions, carrots and beet have been initiated.

Tomato

Some varieties have shown resistance to fruit rot. It is stated that resistance appears to be correlated with the presence of crystals in the stem cells. Crosses have been made between resistant types.

627. 575:633(78.9)
Fifty-Fifth Annual Report of the Agricultural Experiment Station of the New Mexico College of Agriculture and Mechanic Arts. 1943-44 : Pp. 76.

Barley

Selections for leafiness were made in the variety New Mexico Winter. The F_2 of the cross Smooth Awn No. 86 x New Mexico 2518 has been selected.

Cotton

Progeny tests were conducted of plant-to-row selections from lines of Acala and interstrain and intervarietal hybrids.

A report is given of tests of 12 advanced strains of Acala at two locations. No strain significantly outyielded the standard strain Acala 1517. Significant differences in percentage of $1\frac{1}{8}$ inch plus fibres were obtained in both tests. A new strain was isolated in 1943, Acala 5563, which showed good spinning quality.

Sugar beet

Curly top resistant selections have been obtained. Another group of selections exhibit a combination of resistance to curly top and leaf spot.

Pepper

Additional analyses of ascorbic acid content were made on two varieties of hot pepper, Anaheim and College No. 9, and two varieties of paprika, Hungarian and Brown's Hungarian. College No. 9 had a consistently higher ascorbic acid content throughout the season than Anaheim. Brown's Hungarian proved to be higher in ascorbic acid than Hungarian.

Onion

Further selection in White Grano has been carried out to develop a strain which is early, uniform in maturity, broadly ovate in shape, and high yielding.

Beans

New selections of Pinto are under observation. Hybrids obtained include crosses between Pinto and Calico. In advanced strain tests, the Calico and Pinto x Calico strains usually gave lower yields than the Pinto selections.

628.

575:633(79.1)

**Fifty-fifth annual report for the year ending June 30, 1944 of the
Agricultural Experiment Station, University of Arizona 1945 : Pp. 100.**

Wheat

The second back-cross generation of *Triticum Timopheevi* x Baart 38 to Baart 38 has been obtained in the work of breeding for rust resistance. The F_2 of *T. Timopheevi* x Baart 38 was also grown to secure rust resistant segregates of the Baart type for further back-crossing. Baart 38 was crossed on to a strong strawed variety to improve straw quality.

Oats

Leafy smooth-awned selection of Vaughn x Scarab have shown higher yields and more resistance to lodging than Arivat.

Sorghum

High yields of silage were given by the F_1 hybrids Dwarf hegari x Kalo, Dwarf hegari x Atlas and Ajax x Dwarf hegari. In the first two hybrids, however, the lodging percentage was fairly high. In Ajax x Dwarf hegari the lodging percentage was only 13%. A new selection of hegari, Hegari 13, gives a slightly higher yield than the parent variety.

Lucerne

Promising inbred lines are being mentioned.

Cotton

Selection of Santan Acala has been continued.

Selection has been carried out in the F_2 of Santan crossed with New Mexico 1517, Stoneville 2 B and Wilds No. 13, and in the F_1 of the back-crosses of Santan x New Mexico 1517 and Santan x Wilds No. 13 to each respective parent. F_2 plants with lint stronger than that of the stronger parent were obtained in each cross and in the F_1 back-crosses in which the parent with the stronger lint was used as the recurrent parent. Highly significant positive correlations between lint length and strength were found in the F_2 generations of Santan x New Mexico 1517 and Santan x Stoneville 2B.

In the work of breeding long staple cotton, F_4 families of the second back-cross of Pima x Tangüis to Pima were selected for lint characters.

Previous reports of the resistance of Acala to nematode have been confirmed. Individual plants vary considerably in degree of resistance.

Pecan

Observations on the varietal performance at different elevations continue. The varieties Western, Mahan Humble, Delight and Onliwan are more winter hardy than such varieties as Success, Schley and Burkett.

Vegetables

The practicability of the seed production of several vegetables in various parts of Arizona is under investigation.

A mild brown-skinned onion with a white interior has been produced from a cross between Australian Brown and Crystal Wax; it will store for long periods under conditions in southern Arizona.

The hybrid lettuce strains 3-4-43 and 24-43 are early, small-heading types which are to be released in 1945. Strain 3-4-43 resembles Imperial 44 but is considerably more resistant to tip-burn and slime. Strain 24-43 is similar to Great Lakes but is slightly larger and later maturing. Imperial varieties are being selected.

Melon

Nearly complete resistance to both strains, A and B, of powdery mildew has been shown by third generation selections of the cross between U.S.D.A. No. 5 and Arizona 13. Fourth generation selections of the cross between Hearts of Gold and Imperial 45 combine the desirable qualities of both parents. A large, soft, thick-fleshed garden melon has been developed from a cross between the "Jap" melon and Imperial 45.

Vitamin A and C contents have been determined in several different types.

629. CROSS, W. E. 575:633(82)
 Memoria anual del año 1943. (**Annual report for the year 1943**).
 Rev. Industr. Agric. Tucumán 1944 : 34 : 111-90.

Rice

Investigations on the quality of Argentine varieties are reported.

Flax

Forms have been obtained which produce high yields of good quality fibre.

Sugar cane

Extensive tests have been made on Tucumán and other varieties for smut resistance.

Tung

Varietal trials and grafting experiments are reported for *Aleurites Fordii*, *A. moluccana* and *A. montana*.

Citrus fruits

Much attention has been devoted to the problem of finding suitable stocks for the various citrus fruits.

Eucalyptus

Varietal studies are reported.

630. RÖSSGER, W. 575:633.11:578.08
 Beitrag zur Technik der Weizenkreuzung. (**A contribution to the technique of wheat crossing**).
 Forschungsdienst 1942 : 14 : p. 330.
 [From Züchter 1943 : 15 : p. 161].

Hints are given on technique and the advantages of a hybridization plot with successive sowings. For emasculation, about 12 spikelets should be chosen so that they are all ready for pollination at the same time, and so that the pollen from the ♂ plant will suffice for the ♀ florets.

GENETICS 575.1

631. WRIGHT, S. 575.11
The differential equation of the distribution of gene frequencies.
 Proc. Nat. Acad. Sci. Wash. 1945 : 31 : 382-89.

General differential equations are proposed for stationary and non-stationary distributions of gene frequencies.

632. LOE, L. 575.113.7:575.12:575.162.5
 Årsberetning fra Norges Landbrukshøgskole for budsjettåret 1 Juli 1940-30 Juni 1941. (**Annual Report of the Agricultural College of Norway for the year ending June 30, 1941**).
 Oslo, 1942 : Pp. 145.

In co-operation with Håkansson (Lund) as cytological investigator, genetic studies of *Godetia*,

begun in 1931, were continued, the aims being a complete analysis of the genus and utilization of its genetic characteristics for general problems of inheritance. A number of instances were encountered where genetic factors, which have no ostensible effect, in certain race crosses were lethal, or produce sterility in the hybrids. These factors are being analysed on a larger scale and an explanation of their possible role in the production of sterility boundaries between species is being sought.

Experiments with dwarf runner beans were continued on a small scale. Tuberous roots in this material were found to contain a fair amount of protein and may possibly be suitable for human food.

At the Botanical Institute, Nissen made cytological studies of *Alopecurus* hybrids, of apomixis in *Poa pratensis*, and investigated the production of high chromosome timothy strains.

633. STEBBINS, G. L. (JUN.) 575.127.2:576.354.4:633
The cytological analysis of species hybrids. II.
 Bot. Rev. 1945 : 11 : 463-86.

A review under several headings, intended as a supplement to an article by Sax (cf. *Plant Breeding Abstracts*, Vol. VI, Abst. 93), is given of papers which have appeared during the last ten years on the cytology of various interspecific hybrids.

634. SERRA, J. A. 575.17
An attempt at a synthesis of the physiological and cytological concepts of the gene.
 Bol. Soc. Broteriana 1944 : 19 : Sér. 2a : 327-69.

Genetic and biochemical studies on the nature of inheritance are comprehensively discussed. The author accepts the gene as the unit of inheritance corresponding with the elementary chromomere, but suggests that the gene has a complex structure formed of one or more "active zones" and "intermediate linking zones", comparable with the alternating nucleoprotein chromomeres and protein interchromomeres. Point or gene mutations, minute genic re-arrangements, and position effects are analysed on the basis of this hypothesis.

635. WOODS, M. W. and
 DuBUY, H. G. 575.182:632.8
Cytoplasmic diseases and cancer.
 Science 1945 : 102 : 591-593.

In reviewing the virus and non-virus theories of cancer, the authors suggest that these two theories can be synthesized if the mitochondria of plant and animal cells are regarded as an extra-nuclear hereditary system. Since some viruses at least might well be derivatives of mitochondria, the two theories mentioned above may not necessarily be antithetic.

636. ZIMMER, K. G. 575.243:537.5
 Ergebnisse und Grenzen der treffertheoretischen Deutung von strahlenbiologischen Dosis-Effekt-Kurven. (**Results and limitations of the "hit" theory as an interpretation of "dosage-effect" curves in biological irradiation**).
 Biol. Zbl. 1943 : 63 : p. 72.
 [From *Züchter* 1943 : 15 : p. 157].

A short survey is given of the history of the "hit" theory and experiments bearing on the subject. Examples of interpretation of data and the possible deductions that may be made from dosage-effect curves as to the number of "hits" and the field of incidence are given.

637. FRIES, N. 575.243:537.531
 Über röntgen-induzierte physiologische Mutationen bei *Ophiostoma multiannulatum* (Hedgc. et Davids). [**On physiological mutations induced in *O. multiannulatum* (Hedgc. et Davids.) by X-ray irradiation**].
 Ark. Bot. 1945 : 32A : No. 8 : 1-9.

A method of isolating mutants resulting from X-ray irradiation of *O. multiannulatum* is described, and the "auxoheterotrophic" properties of six such mutants are examined with reference to their reactions to biotin, hexavalent sulphur in the form of MgSO_4 or $\text{CH}(\text{SO}_2\text{C}_2\text{H}_5)_2 \text{SO}_2\text{CH}_3$, adenin (or some substance closely resembling it), *p*-aminobenzoic acid and to an unidentified growth factor.

All these physiological mutations affecting physiological response were transmitted to the next generation, except the property exhibited by mutant No. 358 of reducing quadrivalent sulphur.

638. STUBBE, H. 575.243:575:633
 Pflanzenzüchtung und Mutationsforschung. (**Plant breeding and research on mutation**).
 Forschungsdienst 1942 : Shft 15 : p. 333.
 [From Züchter 1943 : 15 : p. 161].

The author discusses fully the value and applicability of induced mutation as a means of introducing variety into crop plants in order to obtain desirable types for cultivation or breeding purposes.

The need for very large numbers of F_1 and F_2 plants and for repeating the induction processes several years in succession is pointed out, as well as the danger of undesirable mutants arising owing to dysgenic mutation, use of old pollen or seed, etc.

Mutation is also considered in relation to physiological races of pathogenic fungi and to the problems of virus research.

639. STRONG, L. C. 575.243:581.04
Genetic analysis of the induction of tumours by methylcholanthrene.
 XI. **Germinal mutations and other sudden biological changes following the subcutaneous injection of methylcholanthrene.**
 Proc. Nat. Acad. Sci. Wash. 1945 : 31 : 290-93.

Methylcholanthrene appears to induce mutation in mice.

ORIGIN OF SPECIES 576.1

640. NOVIKOFF, A. B. 576.12
Continuity and discontinuity in evolution.
 Science 1945 : 102 : 405-06.

It is shown that fallacious conclusions may be drawn in evolutionary studies if insufficient emphasis is laid on the discontinuities apparent in the evolutionary sequence.

641. MCNAIR, J. B. 576.12:581.192
Some comparisons of chemical ontogeny with chemical phylogeny in vascular plants.
 Lloydia, Cincinnati 1945 : 8 : 145-69.

A review is given of the morphological evidence for the theory that plant ontogeny recapitulates phylogeny. It is believed also that this theory is substantiated biochemically, and illustrative examples are given in respect of carbohydrates, fats, essential oils, alkaloids and cyanogenetic glycosides.

642. DILLON RIPLEY, S. 576.12:582
Suggested terms for the interpretation of speciation phenomena.
 J. Wash. Acad. Sci. 1945 : 35 : 337-41.

A discussion is presented on taxonomic units in the light of recent work on speciation. The term "interspecies" is proposed for any "closely related group of geographically overlapping species which have attained physiological isolation in nature".

643. POLIANSKY, V. I. 576.16
(The problem of species in botany and the works of Academician V. L. Komarov).
 Priroda (Nature) 1944 : No. 5-6 : 11-21.

This is a review of the book by Komarov entitled *The Doctrine of the Plant Species* published in 1940. The reviewer points out a number of the essential features of Komarov's concept of the species. Firstly, the species is regarded as a system which is developing, both in space and time, the ultimate unit being the individual, which by its multiplication gives rise to a tribe and ultimately a species. Hence we get the morphogeographical method of systematics, the essential criterion of a species being the possession of a distinct area of distribution. Different species may however be of a different status; new species generally represent a state of development, ancient

species often a state of "being", their developmental period having passed long ago. Hybrid cycles and apomictic groups are regarded as systematic units distinct from that of a species and subject to different laws, and no attempt is made to submit them to the same treatment.

The dialectical concept of the species as a developing system, which makes its use for purely practical purposes of systematics somewhat difficult, has been largely ignored in the International Rules of Botanical Nomenclature. The principle of phylogenetic series, which include not only species and varieties but even genera and higher categories, is the suggested solution for this problem. According to this principle, all forms, even though morphologically rather similar, are described as separate species if they have distinct areas. The species obtained are not all of equal weight and are arranged in series or collective species, comprising phylogenetically related species and often replacing the Linnean species. The series are then grouped into genera and so on, Komarov's final definition of species is "the species is a complex of generations which have arisen from a common ancestor and that under the influence of environment and the struggle for existence become distinct from the remaining world of living beings through selection; in addition to this the species is a definite stage in the process of evolution". This effectively emphasizes the Darwinian factors of evolution in the definition of the species and distinguishes it from the definitions of many geneticists such as Heribert Nilsson, du Rietz, Cuénot, Hurst and Klintedt. A further virtue of the Komarov species concept, it is claimed, is that it provides at the same time an adequate definition of the genus, family and other systematic units.

644. KIRPITCHNIKOV, V. S. 576.16:575.41
(On hypotheses of fixation of modifications by heredity).
Uspehi Sovremennoi Biologii (Advances in Modern Biology) 1944 : 18 : 314-39.

In this discussion and review of the literature the author compares the various theories that have been put forward to explain the conversion, in evolution, of non-hereditary changes—modifications occurring in response to environmental stimulus—into hereditary changes, which occur independently of the environment. It is pointed out that the final stage of this evolution, where complete autonomy is found, occurs only in insects, the vertebrates representing an intermediate degree where the role of function is still quite important.

A discussion of the various hypotheses that have been put forward by different authors to explain the phenomenon shows that very little concrete evidence exists regarding the mechanism of the conversion of a dependent to an independent character, apart from the data of Kamšilov and of Naumenko. The results of Gause, Smaragdova *et al.* are unfortunately confined to unicellular organisms.

All the hypotheses that have been advanced, from Lloyd Morgan down to Waddington, are really variants of the same basic principle, that "adaptive modification is the result of previous natural selection and that natural selection can later fix these modifications and in some cases progressively stabilize the individual development". The importance of the contributions of Soviet scientists in building up a satisfactory hypothesis to explain the parallelism of hereditary and non-hereditary variation without recourse to Lamarckian interpretations is emphasized.

645. FLAKSBERGER, K. A. 576.16:575.42:633.11
[Species—a constantly changing category (as exemplified by a study of wheat)].
Vestnik Socialističeskogo Rasteniévodstva (Soviet Plant Industry Record) 1941 : No. 1 : 153-56.

Setting out from citations of Darwin, Engels and Timirjazez, the author advances arguments (somewhat in the dialectical style) to demonstrate the persistence of wheat species and the relation between this constancy and (1) the frequent variations which arise in varieties as a result of interaction with the recent environment of the particular plant concerned, and (2) the often almost indescribable minute distinctions upon which the allocation of a plant to a particular species is based.

In the author's opinion the word "species" represents both a term in nomenclature and also a definite concept covering forms that actually have existence.

The origin and development of wheat species and sub-species are used in support of the author's argument.

646. FERNANDES, A. and SERRA, J. A. 576.312
576.312.315
Euchromatine et hétérochromatine dans leurs rapports avec le noyau et le nucléole. (**Euchromatin and heterochromatin in their relations with the nucleus and nucleolus**).

Bol. Soc. Broteriana 1944 : 19 : Sér. 2a : 67-117.

An investigation has been made of the relationship between euchromatin and heterochromatin contents on the one hand, and nuclear and nucleolar volumes on the other, the material used being *Narcissus Bulbocodium* L. and *N. juncifolius* Lag. In general, it was found that nuclear and nucleolar volumes were closely correlated. When, however, supernumerary euchromatic chromosomes were present, the nuclear volume was increased in proportion to the quantity of euchromatin, while the nucleolar volume was apparently augmented after an exponential mode. In the case of heterochromatic supernumerary chromosomes, similar results were obtained; the nuclear volume was increased rather less than by the presence of extra euchromatic chromosomes, but the nucleolar volume was augmented more.

These findings are considered in the light of theories relating to the metabolism of the nuclear cycle.

647. LEHOTZKY, P. v. 576.312
Die Wirkung des elektrischen Stromes auf den Zellkern. (**The effect of electric current on the cell nucleus**).
Arch. exp. Zellforsch. 1943 : 25 : 74-78.

Evidence is brought forward to suggest that the chromatin of unfixed cells may be neutral and not acidic. The author passed an electric current through onion epidermis and stained the treated cells afterwards with Brom-Thymol Blue. The achromatic substance of the nucleus is believed to be acidic.

648. SERRA, J. A. and QUEIROZ LOPES, A. 576.312.315
Données pour une cytophysiologie du nucléole. I. L'activité nucléolaire pendant la croissance de l'oocyte chez des Helicidae. (**Data on the cytophysiology of the nucleolus. I. Nucleolar activity during the growth of the oocyte in the Helicidae**).

Portugaliae Acta Biologica, Lisboa 1945 : 1 : Ser. A : 51-94.

The behaviour of the nucleolus has been studied in the developing oocytes of two molluscs, *Helix aspersa* Müll. and *Tachea nemoralis* L. During this period, the nucleoli were found to bud off daughter nucleoli which dissolved thereafter in the nuclear sap. It appears that the nucleoli elaborate nucleoproteins containing ribonucleic acid, and that these, after transference to the nuclear sap by budding, diffuse into the cytoplasm.

649. RESENDE, F. 576.312.34
Hétérochromatine. (**Heterochromatin**).
Portugaliae Acta Biologica, Lisboa 1945 : 1 : Ser. A : 139-73.

A review is given of work on the nature and function of heterochromatin, and on its relationship with euchromatin.

650. RIS, H. 576.312.34
The structure of meiotic chromosomes in the grasshopper and its bearing on the nature of "chromomeres" and "lamp-brush chromosomes".

Biol. Bull. Wood's Hole 1945 : 89 : 242-57.

The author concludes that the chromomere does not exist as a definite structure. The chromonema is regarded as the fundamental unit of the chromosome, the observed longitudinal differentiation of the chromosome being attributed to the differential coiling of the chromonemata.

651. RIS, H. and CROUSE, H. 576.312.34
Structure of the salivary gland chromosomes of Diptera.
Proc. Nat. Acad. Sci. Wash. 1945 : 31 : 321-27.

Evidence is produced in support of the theory that the appearance of bands and interbands in the salivary gland chromosomes of the Diptera is brought about by the complex coiling of a bundle of chromonemata.

652. BAUER, H. 576.312.34:575.243:537.5
Der Aufbau der Chromosomen und seine Abänderung. (**The structure of the chromosomes and its alteration**).
Naturwissenschaften 1942 : 75 : p. 300.
[From Züchter 1943 : 15 : 154-55].

The validity of the contact and the break hypotheses is examined in detail with reference to the origin of chromosome mutations. Relevant literature is discussed.

653. RESENDE, F.,
LEMOIS-PEREIRA, A. DE and
CABRAL, A. 576.312.34:581.036
Sur la structure des chromosomes dans les mitoses des méristèmes radicaux.
(**The structure of the chromosomes in root meristem mitoses**).
Portugaliae Acta Biologica, Lisboa 1944 : 1 : Ser. A : 9-46.

Extensive details are presented on the effect of temperature on chromosome length in *Aloe mitriformis* Mill. var. *Commelinii* (Willd.) Bak., *Trillium sessile* L. and *Vicia Faba* L. The effect of temperature was also investigated with respect to its action on the olistherozones of the chromosomes studied, the term "olistherozone" being proposed for those regions of the chromosome exhibiting lability in staining reaction, length, diameter, etc. The bearing of the results on theories of chromosome structure and on the relationship between euchromatin and heterochromatin is considered.

654. LEVINE, M. 576.353:581.04
The effect of colchicine and acenaphthene in combination with X-rays on plant tissue—I. Introduction.
Bull. Torrey Bot. Cl. 1945 : 72 : 563-74.

A review is given of papers dealing with the effect of colchicine and other substances, and of colchicine in combination with X-ray treatment upon mitosis in both normal and pathological plant and animal tissues.

655. JEFFREY, E. C. 576.354.46
Chiasmatypy or the doctrine of delayed action fertilization.
Science 1945 : 102 : 653-56.

A criticism is presented of the chiasmatype theory of chromosome behaviour. This is believed to lack a sufficient evidential basis. It is suggested as an alternative that chromosome union may occur during fertilization.

656. KELMAN, M. 576.354.46
The forces influencing chromosome pairing in *Drosophila melanogaster*.
Amer. Nat. 1945 : 79 : 567-70.

Drosophila data are presented in support of the conclusion that chromosome pairing is the result of chance meetings of homologous loci during random movement, rather than the result of long-range chromosome attraction.

657. WITKUS, E. R. 576.356:635.41
Endomitosis in plants.
Biol. Bull. Woods Hole 1945 : 89: 191-92. (Abst.).

The process of "endomitosis", first observed by Geitler in 1939 in insect material, has been found to occur in the tapetal cells of *Spinacia oleracea*. During this process chromosome doubling occurs without nuclear division, spindle formation or chromosome movement and the nuclear membrane remains intact. The significance of endomitosis in polyploidy is discussed.

658. DUNCAN, R. E. 576.356.4:575.25
Production of variable aneuploid numbers of chromosomes within the root tips of *Paphiopedilum Wardii*.
Amer. J. Bot. 1945 : 32 : 506-09.

The term "aneusomaty" is suggested to describe the occurrence of scattered aneuploid cells in certain euploid plants. An example is provided by the roots of the orchid *P. Wardii* Summerhayes.

659. PROKOŠEV, S. M. 578.08:577.16
[Methods of determining the titre of the solution of the stain used for estimating ascorbic acid (vitamin C)].
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : No. 3 : 147-48.

Critically examining methods of ascorbic acid titration, the author recommends that in the American method involving parallel titrations of ascorbic acid by means of a stain and by iodine, an iodate should be substituted for the iodine since the former is stable and the latter not.

660. MEYER, J. R. 578.6
Prefixing with paradichlorobenzene to facilitate chromosome study.
 Stain Tech. 1945 : 20 : 121-25.

A technique is described which has given good results in mitotic studies in *Parthenium argentatum*, *Allium*, *Pisum* and other plants.

661. WILSON, G. B. 578.6
The Venetian turpentine mounting medium.
 Stain Tech. 1945 : 20 : 133-35.

The use of a Venetian turpentine mixture as a mounting medium to follow aceto-carmin is suggested. The method has proved to be satisfactory for the examination of both root-tip and pollen mother cells.

662. SERRA, J. A. 578.65:581.192
Improvements in the histochemical arginine reaction and the interpretation of the reaction.
 Portugaliae Acta Biologica, Lisboa 1944 : 1 : Ser. A : 1-8.

A micro-technique suitable for demonstrating the presence of arginine in cytological preparations is described. The principal reagents involved are α -naphthol, followed by sodium hypobromite.

663. SERRA, J. A. and QUEIROZ LOPES, A. 578.65:581.192:576.312
Une méthode pour la démonstration histochimique du phosphore des acides nucléiques. (A method for histochemical demonstration of the phosphorus of nucleic acids).
 Portugaliae Acta Biologica, Lisboa 1945 : 1 : Ser. A : 111-22.

A micro-technique is described for demonstrating the presence of organic phosphorus (especially nucleic acid phosphorus) in cytological preparations. The cells are treated first with a solution of ammonium molybdate in dilute hydrochloric acid, which causes precipitation of the phosphorus in the form of ammonium phosphomolybdate. One drop of a solution of benzidine in acetic acid, and two drops of sodium acetate solution are then added, to give an intense blue coloration in the presence of the phosphorus compound. Confirmation that the phosphorus is derived from nucleic acids can be obtained by a control experiment in which the tissue is pre-treated with the nuclease extract obtainable from rice.

BOTANY 58

664. KJAER, A. 581.142:581.48:581.162.32
Spiringen af nedgravet og tørt opbevaret Frø. I. 1934-39. (Germination of buried and dry stored seed I. 1934-39).
 Tidsskr. Planteavl. 1941 : 45 : 486-507.

Earlier work on the subject is reviewed as an introduction to the experiments conducted by the Danish Government Seed Testing Station, 1934-39. The seeds of many economic crops have been tested and the results are tabulated, with translations of the table headings and a summary for English readers. The importance of the investigation with regard to cross-pollination is obvious.

665. PANČENKO, N. P. 581.143.26.03:633.11:575
(Controlled conversion of varieties of winter wheat in breeding operations and in nature).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : No. 3 : 49-58.

Vernalization of the seed of strains of the winter wheat Svea (of Swedish origin) resulted in increased winter hardiness and yield in subsequent generations.

The findings are stated to support Lysenko's views on the possibility of altering the nature of plant organisms by the application of external agencies.

666. STOUT, A. B. 581.162.5
Classes and types of intraspecific incompatibilities.
 Amer. Nat. 1945 : 79 : 481-508.

A useful review is given of the types of intraspecific incompatibility mechanism encountered, together with suggestions as to the relevant physiological factors conditioning this behaviour.

667. LEK, H. A. A. VAN DER, and KRIJTHE, E. 581.165.72:577.17:581.43
 Bevordering van de wortelvorming van stekken door middel van groeistoffen.
(Promotion of root formation of cuttings by means of growth substances).
 Meded. LandbHoogesch. Wageningen 1940 : 44 : No. 7 : Pp. 91.

The authors' continued experiments, which have been attended with considerable success, are recorded, with a discussion and a well classified and indexed survey of previous work in this field of research.

668. LOTT, R. V. 581.47:001.4
The terminology of fruit maturation and ripening.
 Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 166-72.

The problems of the terminology of "mature" and "ripe" fruits, and of colour in fruit descriptions are discussed. Certain definitions are recommended, and for the standardization of colour terms the use of the spectrophotometer or Munsell system of colour rotation is suggested.

PLANT DISEASES AND PESTS 632

669. ROEMER, T. 632-1.521.6:633
 Resistenzzüchtung. **(Breeding for resistance).**
 Forschungsdienst 1942 : Shft 16 : p. 321.
 [From Züchter 1943 : 15 : p. 161].

The writer stresses the economic importance and the many-sidedness of the problems of breeding for resistance and the need for co-operation from various branches of science in their solution. The successes so far obtained in the breeding for resistance in vines, potatoes and cereals are reviewed. The prospects as regards other crop plants too appear promising.

670. KESSLER, W. and RUHLAND, W. 632.111-1.521.6:633
 Über die inneren Ursachen der Kälteresistenz der Pflanzen. **(On the internal causes of cold resistance of plants.)**
 Forschungsdienst 1942 : Shft 16 : p. 345.
 [From Züchter 1943 : 15 : p. 159].

In this physiological study of the fundamental nature of cold resistance, the authors examine the relations between frost hardening and frost resistance, the condition of the cell plasma during the state of greatest resistance and the relations between resistance and the developmental activity of the plant.

671. LING LIH 632.4(51)
Host index of the parasitic fungi of Szechuan.
 Nanking J. 1941 : 11 : No. 3 : 1-26.

A useful list is provided of the parasitic fungi of Szechuan. The pathogens are listed under their respective hosts, the latter being arranged alphabetically. Information is also given on the distribution within Szechuan of each parasite.

672. DODGE, B. O. 632.4:577.8
Further remarks on mycogenetic terminology.
 Mycologia 1945 : 37 : 784-91.

Recent opinions are reviewed on the nature of sex and heterothallism in the fungi and on the genetical basis of these phenomena.

673. PRATT, R. and
DUFRENOY, J. 632.421.2:581.192
Physiological comparison of two strains of *Penicillium*.
Science 1945 : 102 : 428-29.

P. chrysogenum X1612 is able to synthesize penicillin when grown on media containing less complex penicillin precursors than are necessary for penicillin synthesis in *Penicillium* sp. NRRL 1984-A.

674. CHILTON, S. J. P.,
LUCAS, G. B. and
EDGERTON, C. W. 632.421.9:577.8:575.11
Genetics of *Glomerella*. III. Crosses with a conidial strain.
Amer. J. Bot. 1945 : 32 : 549-54.

A conidial strain of *Glomerella* unable to produce perithecia was obtained from a plus strain. When crossed however with either a plus or minus strain, perithecia were formed, more readily in the second case than in the first. The ascospores produced from the first combination gave rise to plus and conidial strains, a plus strain and a minus strain, these four types occurring in approximately equal proportions.

675. WINGE, Ø. 632.422.3:575.114:575.246:575
On segregation and mutation in yeast.
C.R. Lab. Carlsberg 1944 : 24 : Sér. Physiol. : 79-96.

The genetic segregations observed by the author and other investigators in species of yeast are described; these include segregations for one or two gene pairs, and multiple heterozygosity with crossing-over. An account of mutation in yeast is given, and methods of improving the industrial yeasts are discussed. It is pointed out that by selection of the most suitable mutant types in brewer's yeast, the capacity to sporulate has been lost, so that improvement by hybridization is strictly limited. Other industrial yeasts have, however, retained the capacity to form spores. Photographic plates of segregating and mutant forms in two strains of *Saccharomyces cerevisiae* and *S. unisporus* are presented.

676. LINDEGREN, C. C. and
LINDEGREN, G. 632.422.3:575.22
Environmental and genetical variations in yield and colony size of commercial yeasts.
Ann. Mo. Bot. Gdn 1943 : 30 : 71-82.

Commercial yeasts were found to produce two distinct types of colonies, viz., large smooth primary colonies and small variable secondary colonies, provided a rich medium was used; the latter type was very low in yield and fermentative capacity. Selection for yield within a clone indicated that the primary colonies were all closely related genetically.

677. SKOVSTED, A. 632.422.3:575.242
Successive mutations in *Nadsonia Richteri* Kostka.
C.R. Lab. Carlsberg, 1943 : 23 : Sér. Physiol. : 409-53.

Giant colonies with sectorial mutations were produced from single spores of *N. Richteri*. A detailed study was made of the mutations derived from the culture of one of the mutant types. The process of "successive" mutation was observed. A number of types were isolated, characterized by marked differences in many characters, and differing from the original type in forming spores on wort gelatine, although showing considerable variability in sporogenic capacity. No reversible mutations were found. The results are discussed in relation to the mutant behaviour of fungi reported by other investigators, and the evolutionary significance of successive mutation.

678. DITLEVSEN, E. 632.422.3:576.31:575.123
A case of simple segregation in *Saccharomyces italicus*.
C.R. Lab. Carlsberg 1944 : 24 : Sér. Physiol. : 31-37.

Heterozygosity for a gene pair *Ll* determining cell form has been observed in an isolated strain of *Saccharomyces italicus*. Of the four spores in each ascus, two formed long-celled colonies (*LL*) and two short-celled (*ll*). The two types which diploidize are able to form spores, and they breed true. Hybridization was effected between the two types; the hybrid so obtained was similar to but not identical with the original culture.

679.

LINDEGREN, C. C.

632.422.3:576.353

632.422.3:576.312.35

An analysis of the mechanism of budding in yeasts and some observations on the structure of the yeast cell.

Mycologia 1945 : 37 : 767-80.

Some important cytological observations are reported for *Saccharomyces cerevisiae*. The structure of the resting cell is interpreted along the lines suggested by Wager and Peniston; the lateral body staining with iodine is regarded as a centriole, while the nucleolus is believed to be suspended in the nuclear vacuole. When budding occurs, a slender tube grows out from the vacuole, and on its reaching the periphery of the cell, a protuberance arises into which the tube passes. By further growth, the protuberance enlarges to form a daughter cell, and the vacuolar tube swells out within it to form a new nucleolar vacuole, and its connexion with the original vacuole is severed. The centriole also divides during this process.

The number of diploid chromosomes in this species appears to be twelve.

680.

BAUCH, R.

632.422.3:576.356.5:581.04

Chemogenetische Untersuchungen an der Hefe. (Chemogenetic researches on yeast).

Ber. dtsch. bot. Ges. 1943 : 60 : 42-63.

This review collates work done by the author and other investigators on the effect of chemical agents on yeast. It has been found that three classes of substances may induce the formation of gigas races: (1) substances such as camphor which inhibit mitosis, (2) carcinogenic substances, and (3) growth hormones. The theoretical consequences of these discoveries are considered.

681.

NYBERG, C.

632.422.3:576.356.52

Generationsväxling med diploid och haploid fas hos jästsvampar. (Alteration of generations with diploid and haploid phase in yeast fungi).

Nord. Medicin 1942 : 13 : 26-28.

Adopting a similar terminology to that used for bacteria, the writer discusses his experiments on spore-forming S and non-spore-forming R colonies isolated from yeast races. He advances evidence, based on the behaviour of one particular strain, to show that these two forms may correspond to diploid and haploid phases respectively. The complications of the situation, as revealed in the phenomena of spore formation, conjugation, etc., and the suggested genetic interpretation are examined in detail. It may be regarded as certain that some yeast fungi can pass from a diploid to a haploid phase and vice versa. Incidentally the writer has adopted provisionally a theory that differences between the behaviour of small and large R colonies in fresh cultures are possibly due to a greater or lesser amount of hormone substance produced by the cells and tending to promote conjugation or budding respectively.

682.

QUINTANILHA, A.

632.472.3:577.8

La conduite sexuelle de quelques espèces d'agaricacées. (The sexual behaviour of some species of the Agaricaceae).

Bol. Soc. Broteriana 1944 : 19 : Sér. 2a : 27-65.

Observations are reported on the compatibility systems found in various species of the following agaric genera: *Agrocybe*, *Coprinus* and *Drosophila*.

683.

CLAUSEN, R. T.

632.951.1(73)

Yam bean, warm-climate plant is a possible new insecticide.

Fm Res. 1944 : 10 : No. 3 : p. 14.

Short descriptions are given of the Central and South American species of *Pachyrhizus*. The most promising species appears to be *P. ensus* in which varietal differences in rotenone content have been discovered.

684.

KREIER, G. K.

632.951.1:575.12:575.42(47)

(Pyrethrum as a plant insecticide and its cultivation under the conditions in the U.S.S.R.).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record) 1940 : No. 3 : 95-106.

This is a general survey of the position, especially in the U.S.S.R., the Balkans and other European countries, in regard to the cultivation of pyrethrum and other plants as a source of pyrethrin.

Previous work on the subject is reviewed, including past Russian findings on the pyrethrin content of various species of *Pyrethrum*, with discussions on methods of cultivation, harvesting, etc.

As regards the best type of plant for maximum pyrethrin production, it seems possible from the author's breeding experiments that small flowered forms have more flowers per plant and may therefore give a greater yield of pyrethrin, as the flowers contain more than the stem.

A study of the phasic development of the plant should be made to make it possible to control the bushiness of the plant, the single-flowered condition and the time and abundance of flowering. Indications are given of the lines along which breeding has proceeded. The present programme includes the selection of natural hybrids between spring and winter forms to isolate late flowering, high yielding types from early flowering ones.

685. WHITE, D. G. 632.951.1:581.6:581.8
A comparison of the number of protoxylem strands with the rotenone content of derris roots.

Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 370-74.

The average number of protoxylem strands in the roots of four varieties was found to be a varietal characteristic. No correlation was, however, obtained between the rotenone content of the different varieties or individual roots and the number of protoxylem strands.

ECONOMIC PLANTS 633

686. 633(78.6)
Varieties of farm crops for Montana 1945.

Circ. Mont. Agric. Exp. Sta. 1945 : No. 182 : Pp. 35.

Descriptions are given of the varieties of cereals, flax, forage grasses and legumes, dry beans and soya beans, which are recommended for cultivation.

687. VARNEY, H. R. 633:575(74.3)
Fifty-seventh Annual Report of the Vermont Agricultural Experiment Station—July 1, 1943–June 30, 1944.

Bull. Vt Agric. Exp. Sta. 1944 : No. 520 : Pp. 34.

In addition to varietal tests of several crops the following work is reported:—

Clover

Genetic and cytological studies of zigzag clover have been carried out.

Pome fruits

Work on apple and pear aims at the elimination of the unpaired chromosome in self-sterile varieties in order to obtain self-fertile forms.

688. *GRIESINGER, R. 633:576.356.5:575
 Die Bedeutung der Ergebnisse der Polyploidieforschung für die Pflanzenzüchtung. (**The significance of the results of research on polyploidy for plant breeding**).
 Ber. dtsh. bot. Ges. 1943 : 60 : 36-41.

This review on recent research on the utilization of polyploidy in breeding lays particular emphasis on the possibilities of obtaining larger plants with more valuable chemical constitutions, and on its usefulness in restoring fertility to F_1 hybrids and their progeny.

689. LEE, TSUNG-LÊ, and HWANG, TSUNG-CHEN. 633:581.331.2:581.142:581.04
Growth stimulation by manganese sulfate, indole-3-acetic acid and colchicine in pollen germination and pollen tube growth.
 Acta Brevia Sinensia 1944 : No. 8 : 21-22. (Mimeographed).

Manganese sulphate promoted pollen germination and pollen tube growth in several crops more effectively than indole-3-acetic acid and colchicine.

* An extended summary of this paper is on file at the Bureau.

690. CALDWELL, J. S.,
CULPEPPER, C. W. and
HUTCHINS, M. C. 633:581.6(73)
**Further comparative studies of varieties of certain fruits and vegetables
for dehydration.**

Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 375-87.

A summary is given of the results of investigations carried out in the 1943 season on the suitability for dehydration of varieties of the following fruits and vegetables: garden beet, potato, peach, blueberry, carrot, winter squash (*Cucurbita maxima*), and pumpkin (*C. Pepo* and *C. moschata*).

691. HANSEN, N. E. 633-1.524:007(78.3)
634:575.007(78.3)
Fifty years work as agricultural explorer and plant breeder.
42nd Ann. Rep. S. Dak. State Hort. Soc. for the year ending June 30, 1945 :
119-36.

N. E. Hansen gives an account of his plant explorations and fruit breeding work.

692. ČESNOKOV, P. G. 633-2.7-1.521.6
(Resistance of species and varieties of crop plants to insect pests).
Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
1940 : No. 3 : 131-44.

This paper, which is a review of the subject with citations of the results of various workers, deals with: (1) the terminology of insect resistance; (2) the diversity and classification of the phenomena conditioning degrees of resistance of species and varieties of agricultural crops to insect damage; (3) absence of damage to plant forms (*a*) as a result of selective action of the pest and (*b*) even when infestation occurs, and passive and active resistance (immunity) of the host in such cases; and (4) tolerance of species and varieties.

There is a bibliography of 66 works in English, Russian and German.

693. SCHUSTER, G. L. 633.00.14(75.1)
633.2-2.112-1.521.6(75.1)
Annual Report of the Director for the fiscal year ending June 30, 1944.
Bull. Del. Agric. Exp. Sta. 1944 : No. 251 : Pp. 46.

Varietal trials of cereals, forage grasses, potato, horticultural vegetables, and soya bean are reported.

Among various grasses reed canary grass, smooth brome grass, tall fescue and orchard grass have shown the highest degree of drought resistance.

CEREALS 633.1

694. FRÖIER, K. 633.1:575(48.1)
633.1:575(47.1)
633.1:575(48.9)
Stråsådessorter i våra skandinaviska grannländer. (**Varieties of cereals in
the countries of our Scandinavian neighbours**).
Årsb. Jordbruksforskning, Stockholm 1945 : 151-63.

The particular varieties of oats, barley, wheat and rye grown in Norway, Finland and Denmark are described or mentioned with informative comments on old forms as well as the newer varieties produced by hybridization, etc., to replace them.

Among the varieties in Norway mentioned (other than those already noted in *Plant Breeding Abstracts* or recorded in the variety lists) are the two new oat varieties Strind and Hird, which are improvements as regards strength of straw and quality of grain; and Hein, which gives a good yield and is better than Perle in stiffness of straw and grain quality. Nidar I and II are very early varieties; some early Norwegian land oats are also grown which should be of great value for hybridizations in future breeding. The barleys include the widely grown Maskin (a line selected from Bjørnebykorn) which is so early that it can be cultivated in high mountain parts and in the far north. Newer and more promising varieties from hybridization between Asplund and Maskin are Varde, Herse and Bonus. In the far north Jotun, Sölen and Gløyakorn are the most reliable in yield.

Norwegian wheat growing is based mainly on spring forms which owing to the climate need to be mildew resistant. Fram II, one of the earliest varieties, and specially resistant to mildew, is not early enough for the more northerly regions and higher altitudes, while Garnet and Sibir (from a Siberian land variety Chogot) are early but not very high yielding. The new hybrid variety Snøgg (Quick), first put on the market in 1942, gives a better yield and is intermediate between Garnet and Sibir in earliness.

The most winter hardy and therefore the most reliable winter wheat variety is Enger, a land variety from Enger in Rødnes, but it has a weak straw and is susceptible to yellow rust. A new winter variety Hein from Møistad has not excelled Enger greatly in cultivation value.

In the high part of Norway the old land rye varieties Refsum, Trønder and Hedemark are still grown. An improved Norwegian variety is Gråråg (Grey Rye) 0114 which shows somewhat higher yield of grain and strength of straw.

Finland requires very early varieties reaching full maturity, especially in the northern parts of the country. The most important zones of cultivation have been defined by Pesola. Plant breeding has reached a high level, but many Swedish varieties are grown.

The Finnish varieties include the oats Esa, Kytö, Osmo I and II, Pelso, Simo and Tammi, some of which are derived from crosses of Finnish land oats with Swedish forms, the wheats Pika II and the hybrids Sampo, Varma and Panu, the barleys, Louki, Perttu, Lappi II and Olli, and the ryes, Toivo, Ensi, the hybrids, Pekka and Onni, and the two very winter hardy forms Härma and Oiva.

In Denmark it is remarkable how rapidly the results of plant breeding are applied in practice, possibly owing to the vigorous methods of Danish research and the way in which variety trials are organized.

The recently produced oat, Borris Opus, appears to equal Örn and Sol II* though it has a somewhat lower proportion of grain to chaff and not such well filled grains as the Swedish forms. The Danish barley Abeds Acherbyg is a stiff-strawed malting type which is a considerable advance on the English or Irish Archer.

Abeds Rigel, a new barley, put on the market in 1944, is a Maja x Kenia cross, and is competing with Maja and Freja (Svalöf) and Balder (Weibull).

A new rye Kortstråig Petkus (Short-straw Petkus) appears, during the short time it has been on trial, to surpass all previous ryes tested, though not quite equal to Kungs II in strength of straw. Danish winter wheat varieties are remarkable for high yield and strength of straw but are deficient in winter hardiness. Danish varieties include Trifolium 14 (a selection from the Dutch wheat Wilhelmia), Lawaetz Als (from the land wheat from Als), Pajbjerg Ideal (a selection from Trifolium 14), and Pajbjerg Kongehvede I and II (a selection from the preceding).

695. DRAHORAD, F. 633.1:575(49.4)
 Züchtung alpinen Getreidearten. (Breeding Alpine cereals).
 Forschungsdienst 1942 : Shft 16 : p. 364.
 [From Züchter 1943 : 15 : p. 162].

The breeding of local varieties is of special importance in the intensification and improvement of grain culture in Alpine districts. As initial material the Alpine land varieties are being used that are grown on the Alpine experiment plots in Sistrans in the Tyrol. Breeding is also being carried on with hitherto unimproved forms of *Triticum compactum*, many-rowed spring barleys, especially the six-rowed Montafoner land barley (Pumperkorn) and some awned autumn wheat types. True-breeding rust resistant strains were selected from Binkel wheat and six-rowed spring barley. The yields from Binkel ranged from 22 to 27 dz. per ha., while from the six-rowed barleys 36 dz. per ha. were obtained from some strains.

For the first time an attempt has been made to establish a variety register trial in a high lying Alpine district.

696. 633.1:575(79.6)
Report of Branch Experiment Stations.
 Circ. Univ. Idaho Agric. Exp. Sta. 1944 : No. 94 : Pp. 16.

Wheat

At the High Altitude Branch Experiment Station, two hybrid varieties, Ridit x Relief (C.I. 11925) and Ridit x Utah Kanred, have shown freedom from dwarf smut.

* Synonymous with the Danish variety Staal.

Oats

At the Aberdeen sub-station a high yielding selection (C.I. 4136) from the cross (Victoria x Richland) x Bannock is to be increased for possible distribution. It is more resistant to lodging than the standard varieties, and has exhibited smut resistance and some resistance to stem rust.

Barley

At the Aberdeen sub-station two selections show promise of being superior in yield to Trebi and Velvon. They show improved resistance to lodging.

697. 633.1:575.42(48.5)
 SUNDELIN, G. 633.1.00.14(48.5)
 Sortvalet för stråsådesodlingen. (**The work of selecting varieties of cereals for cereal cultivation**).
 Årsb. Jordbruksforskning, Stockholm 1945 : 124-44.

The great importance of the Swedish annual local trials of varieties, directed by the Agricultural Research Institute (Jordbruksförsöksanstalt) and carried out in co-operation with the provincial agricultural societies, is stressed and the various economic characters (including especially reliability) required in varieties ultimately released for cultivation are enumerated. A list is provided of varieties of wheat, rye, barley and oats on sale by the larger seed firms in 1944 for cultivation.

In 1944, a questionnaire was sent to the provincial agricultural societies to find out what varieties were actually being used in various parts of the country and how the choice was correlated with the results of scientific research. The winter wheat Thule III and the oat Ligowo III appear to be new forms. The performance in 1944 of recommended varieties in different localities is given in a short survey covering the various crops. Most of the varieties, except the wheat Thule III and the oat Ligowo III have already been referred to in *Plant Breeding Abstracts*.

The wheat Thule III is recommended for growing in very severe conditions.

A concise survey is given of the type of cereal required in different parts of Sweden and how the different varieties have met these needs (cf. Abst. 734).

698. FUCHS, W. H. 633.1:581.142:575:631.521.6
 Die Grundlagen der Züchtung auswuchsfester Getreidesorten. (**Principles of breeding cereal varieties resistant to germination in the ear**).
 Forschungsdienst 1942 : Shft 16 : p. 339.
 [From Züchter 1943 : 15 : 162-63].

Tests for the defect in question can be carried out on the ear or by germination tests of threshed kernels. The writer prefers the former method.

Very little success could be attained with rye, but various forms resistant to germination in the ear were found in wheat and barley and among some foreign varieties of oats.

The most important factor for resistance is a physiological dormancy, which in general exhibits a marked dependence on temperature. The influences inhibiting germination are located partly in the embryo and partly in the endosperm.

699. ERICSSON, G. and 633.1-1.557:581.02(48.5)
 GENCHEL, M.
 Härkomstförsök med korn och havre utförda vid Statens Försöksgård Offer 1935-1942. (**Provenance experiments with barley and oats, carried out at the Offer State Experiment Farm, 1935-42**).
 Medd. Lantbr. Jordbruksförsöksanstalten 1945 : No. 12 : Pp. 48.

These trials, conducted with Vega barley and White Odal oats, showed that seed grown at Offer, or under similar conditions, gave the same yield and quality of grain as seed grown in southern Sweden.

700. 633.1-2.6-1.521.6(75.3)
 MCBETH, C. W. 633.2-2.6-1.521.6(75.3)
Tests on the susceptibility and resistance of several southern grasses to the root-knot nematode *Heterodera marioni*.
 Proc. Helminthol. Soc. Wash. 1945. : 12 : 41-44.

Nearly 20 grasses and cereals, either commonly grown in the coastal plain of Georgia or under experimental observation for adaptability to this region, were tested for resistance to root-knot

[*Heterodera marioni* (Cornu) Goodey]. Woolly fingergrass (*Digitaria eriantha* var. *stolonifera* Stapf), included in the field test and two greenhouse tests, and Pensacola Bahia grass (*Paspalum*), included in one greenhouse test, showed high resistance. Differences in reaction were found between two strains of Bermuda grass (*Cynodon Dactylon*) and between two strains of pearl millet (*Pennisetum glaucum*).

701. ATKINS, I. M. and
DAHMS, R. G.

633.1-2.7-1.521.6:575(73)

Reaction of small-grain varieties to green bug attack.

Tech. Bull. U.S. Dep. Agric. 1945 : No. 901 : Pp. 30.

A severe attack of green bug (*Toxoptera graminum* Rond.) in Texas, Oklahoma and Kansas during 1942 provided the opportunity of obtaining data on the resistance of many varieties and strains of wheat, oats and barley.

Under conditions of heavy infestation the most resistant strains of wheat were selections from the cross Marquillo x Oro, which are also resistant to Hessian fly attack. Other wheats showing some measure of resistance included Denton, Early Blackhull, Wichita, Blackhull, Blackhull hybrids, and certain Chinese and Russian strains, but none of these appears to be able to resist a heavy attack.

Many barleys, mostly from the orient, proved to be highly resistant. Several Gatami strains were highly resistant, and the F_3 bulked hybrids of Black Gatami x Wintex and Black Gatami x Texan grown at one location gave resistant segregates. The highly resistant varieties, Esaw, Sunrise and Smooth Awn 86, all have a common parent, Nakano Wase, a Japanese variety. Green bug resistance therefore appears to be an inherited character.

Most of the oat varieties examined were commercial red varieties and hybrid strains. None exhibited marked resistance, although differences in susceptibility were noted at one location.

702.

633.1.00.14(47)

Plant industry. 1. New high-harvest crops.

Agriculture, Moscow 1945 : No. 4 : 3-5.

Varieties of spring and winter wheat, rye and oats, recommended for different regions as a result of the regional tests conducted since 1937, are briefly described. The winter wheat varieties include Erythrospermum 15, Lutescens 17, Odesskaya 5, Voroshilovskaya and Ulyanovka. The spring wheat varieties mentioned are Milturum 553 and Albidum 3700 and Diamant. The winter-hardy drought resistant rye, Saratovskaya 1, is recommended for the south-eastern areas. The disease resistant oat Sovetsky shows a wide adaptability to 17 different parts of the U.S.S.R.

WHEAT 633.11

703. HAMILTON, J. W.
Pawnee "pays off"

633.11(73)

Sth. Seedsman 1945 : 8 No. 10 : 16, 55.

The new hard red winter wheat variety Pawnee is described (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 1200).

704. HOROVITZ, N.

633.11(82)

Los principales trigos argentinos de invierno y primavera. (**The principal Argentine winter and spring wheats**).

"Granos" Semilla Selecta, B. Aires 1944 : 8 : Nos. 10-12 : 37-38.

It is pointed out that the terms "winter" and "spring" cannot be applied strictly to the wheats grown in Argentina, but that, nevertheless these terms are convenient in distinguishing between late and early varieties. A short account is given of the most suitable Argentine varieties from this point of view.

705. GIOVANNINI, J. M.

633.11(89)

Estudio de diversas variedades de trigo adquiridas por el Servicio Oficial de Distribución de Semillas, con y sin inspección de cultivos en pie, en relación a su identidad. (**Study of various wheat varieties acquired by the Official Seed Distribution Service, with and without an inspection of the standing crops, in relation to their identity**).

Rev. Fac. Agron., Montevideo 1945 : No. 39 : 19-40.

This report of wheat seed testing trials is prefaced by figures and descriptions of the following

varieties: Rieti, Porvenir, Centenario, Estanzuela Litoral, Estanzuela "Litoral 1", Klein 31 (Estanzuela "1931"), Klein Amalia Klein, Klein Acero and Klein Pirámide.

706. ŠESTAKOV, V. E. 633.11:575(47)
(Results of breeding winter wheat at the Petrovskii Experiment Station).

Bjulletenij Instituta Zernovogo Hozjaistva Jugo-Vostoka S.S.S.R. (Bull. Inst. Grain Husb. S.E. U.S.S.R.) Saratov 1945 : No. 2 : 12-15.

The policy of the plant breeders, the results of which are described in the present article, is to produce winter wheats which are hardy, give high yields of grain, withstand drought, mature early, enable good bread to be made from the grain, do not succumb to black and yellow rusts and do not lodge.

The varieties described satisfy many of the characters which were sought, though immunity to *Puccinia* spp. is still in process of being established. I. Z.

707. SHARBAKOFF, C. D. 633.11:575(76.8)
Wheats for Tennessee growers.

Circ. Tenn. Agric. Exp. Sta. 1943 : No. 86 : Pp. 7.

Descriptions are given of varieties recommended for cultivation in various parts of Tennessee which have been selected from local wheats. These include Bluestem 2 and selections of Fulcaster. Other bearded and smooth wheats which are considered to be of practical importance are also described. Breeding for resistance to leaf and stem rust has been in progress since 1937.

708. 633.11:575(77.2)
Wheat breeding, Department of Botany.

Report of the Seventh Eastern Wheat Conference, Lafayette, Indiana, June 19-20, 1941 : 7-9.

An account is given of breeding for disease resistance carried out by the Department of Botany at the Agricultural Experiment Station, Purdue University.

Breeding methods include back-crossing, multiple crosses, and modified bulk methods. The back-cross method is receiving increasing attention. Many of the more promising advanced generation strains selected for disease resistance involve as parents Trumbull, Wabash and related strains, and American Banner. Breeding for resistance to leaf and stem rust, loose and stinking smut, mosaic, powdery mildew and Hessian fly is reported.

709. 633.11:575(77.2)
Soft winter wheat breeding programs and problems.

Report of the Seventh Eastern Wheat Conference, Lafayette, Indiana, June 19-20, 1941 : 10-11.

The summary of the statements on wheat improvement in the different states contains the following items of interest:—

C. A. Lamb (Ohio)

The advantage of the bulk method in hybrid breeding is stressed.

F. B. Bussell (New York)

Selection has been largely in white grain types.

H. M. Brown (Michigan)

Trumbull has proved to be resistant to local collections of loose smut.

B. Koehler (Illinois)

Several soft red winter varieties including Fulhio, Fulcaster, Wabash and Thorne, have shown considerable mosaic resistance.

J. M. Poehlman (Missouri)

The cross Early Premium x Kawvale is under investigation with a view to developing early maturing, disease resistant types, better adapted as nurse crops.

In the discussion of regional co-operative studies brief reports are given of the following: (1) breeding for resistance to races of bunt and loose smut, (2) various tests of baking quality carried out at the Federal Soft Wheat Laboratory, Ohio, and (3) cytogenetic studies on the 42-chromosome wheats and on the inheritance and linkage of X-ray induced characters in the 14-chromosome wheats.

710. CUTLER, G. H. 633.11:575(77.2)
Soft winter wheat breeding project, Department of Agronomy, Purdue University, June 1941.
 Report of the Seventh Eastern Wheat Conference, Lafayette, Indiana, June 19-20, 1941 : 3-7.

Since 1926 the chief objectives of breeding work have been to combine pastry quality, winter hardiness, and several other desirable agronomic qualities. Standard soft winter varieties, susceptible to winter injury, have been crossed on to hard varieties with superior winter hardiness. An account is given of the methods used in breeding and testing.

711. WORZELLA, W. W. 633.11:575.11:001.4
A preliminary summary of genetic studies in hexaploid wheats and proposed symbols for the characters.
 Report of the Seventh Eastern Wheat Conference, Lafayette, Indiana, June 19-20, 1941 : 13-17.

A standard system of genetic nomenclature in the hexaploid wheats is advocated. A table is given indicating the mode of inheritance of over 60 characters and the symbols recommended for the factors. Another table lists the linkage relationships of several characters.

712. SCHAD, C.,
 MAYER, R. and
 MÉNERET, G. 633.11:575.11:664.641.016(44)
Contribution à l'étude de la qualité du blé et de son amélioration dans la région du Centre. (A contribution to the study of the quality of wheat and its improvement in the Central Region).
 Ann. Agron., Paris 1941 : 11 : 223-69.

A study has been made of the factors contributing to good baking quality in French wheats. These include cultural methods, the effect of season on the environment as well as climatic factors. Varieties and their improvement are also investigated.

A list of the best varieties for the Central Region is given with their principal characteristics. Crosses have been made of (Paix 13 x Oscar Benoist) and (K8 x Székács) 42 with Providence, a good quality wheat resistant to lodging. By 1940 lines had been obtained superior to Vilmorin 27 and with other good qualities.¹

For a variety suitable for the mountainous districts, the variety Blé des Dômes has been selected from the cross K8 x Székács. This variety is resistant to cold with good commercial qualities and resistant to yellow and black rusts. As regards quality, it is better than any other variety that can be grown in the mountains.

A selection of wheat for Bourbonnais has also been made as well as the selection of spring wheats.
 R. M. I.

713. PAO, W. K.,
 LI, C. H.,
 CHING, T. W. and
 LI, H. W. 633.11:575.11-181.13
Studies on the inheritance of dwarfness in common wheat.
 Acta Brevia Sinensia 1944 : No. 7 : 20-21. (Abst.). (Mimeographed).

A summary of this study has been previously given (cf. *Plant Breeding Abstracts*, Vol. XV, Absts 178 and 179).

714. MEISTER, N. G. 633.11:575.127.5:633.14
(Varieties of winter wheat from Saratov).
 Bulettenj Instituta Zernovogo Hozjaistva Jugo-Vostoka S.S.S.R. (Bull. Inst. Grain Husb. S.E. U.S.S.R.) Saratov 1945 : No. 2 : 6-11.

A number of varieties, produced by the Institute, and some complex hybridizations which are also being carried out, are referred to. The greater part of the article, however, is concerned with describing the following hybrids of wheat with rye:—

Lutescens 434/154 is a cross between a half-hardy winter wheat, *Erythrospermum* 648, and Eliseevskaja rye. It is hardy, early to mature and withstands drought. Variety trials have shown its yields to compare favourably with those of established varieties. The hybrid also has another valuable character; it acquires, during the early part of the light phase, a capacity

to withstand cold, and retains this capacity throughout the winter. The hybrid can therefore be sown early; and in spring it will not take harm should a sudden spell of cold suddenly return. *Lutescens* 27/36 is less hardy than the preceding hybrid, but its matures early, and survives drought. The grain possesses good baking-qualities; and its yield is satisfactory. *Lutescens* 230 has grain which is large, semi-flinty, and of good quality for baking and other such processes. The plants are early and drought-resistant; the straw is not prone to lodging or the ear to shattering. The variety is a hybrid of parents each of which is a hybrid of wheat and rye. *Erythrosperrum* 287 is hardy, and survives drought. *Erythrosperrum* 356, in addition to the characters which recommend it to the south-eastern regions where cold, heat and drought must be contended with, is fairly free from the attacks of the frit and Hessian flies, and very resistant to drought. It withstands cold as successfully as the standard variety, *Lutescens* 329. The thousand-corn-weight is 40 grm., and the baking quality of the semi-flinty grain is moderately good. Some promising complex hybrids are being tested. Among them are F_1 (*Hostianum* 237 x winter rye) x *Lutescens* 329, and F_1 (*Hostianum* 237 x winter rye) x *Erythrosperrum* 46/131, and crosses of the American variety Marquis with *Lutescens* 329. I. Z.

715. LOVE, R. M. and
SUNESON, C. A. 633.11:575.127.5:633.289:576.356
Cytogenetics of certain *Triticum-Agropyron* hybrids and their fertile derivatives.
Amer. J. Bot. 1945 : 32 : 451-56.

Hybrids have been obtained from the crosses *T. durum* x *A. trichophorum* and *T. Macha* x *A. trichophorum*. There appears however to be little homology between the chromosomes of the two parental combinations and the normal hybrids were sterile. Some fertile hybrids with higher chromosome numbers were also obtained, presumably through fertilization by partially-reduced or non-reduced gametes.

716. CÂMARA, A. 633.11:576.312.34
Um estudo citológico dos trigos *durum* Portugueses. (A cytological study of the Portuguese *Triticum durum* forms).
Bol. Soc. Broteriana 1944 : 19 : Sér. 2a : 273-87.

The importance of the *T. durum* wheats for cultivation in Portugal and the need for their improvement are pointed out. The author discusses the systematics of *T. durum* and reports observations on the chromosome dimensions in 10 varieties of *T. durum*. The results showed that though in certain cases varieties classed as closely related botanically might show marked differences in the ideogram, and vice versa, the general tendency was for the caryological and botanical classifications to be in agreement.

717. CHIN, T. C. 633.11:576.354.4
633.11:576.16
The cyto-genetical studies of the Indian dwarf wheat hybrids.
Acta Brevia Sinensia 1944 : No. 6 : 10-11. (Abst.). (Mimeographed).

Genetical and cytological evidence has been obtained indicating that *T. sphaerococcum* is derived from *T. vulgare*, differing from it by an inverted chromosome segment in which several linked recessive genes are located.

718. CHIN, T. C. and
CHWANG, C. S. 633.11:576.354.4
633.11:576.16
The cyto-genetical studies of the "makka" wheat hybrids.
Acta Brevia Sinensia 1944 : No. 6 : 9-10. (Abst.). (Mimeographed).

The genetics and cytology of the Makka wheat hybrids have been investigated. In both *T. Spelta* and *T. Macha* beardlessness and the mode of disarticulation of the rachis are dominant characters. In the hybrids density of the ears and the length of awns are intermediate. All the hybrids showed considerable sterility, and the hybrid between *T. Macha* and *T. dicoccoides* approached complete sterility. The cytogenetical data obtained indicate that *T. Macha* is not necessarily the ancestor of the present-day *T. Spelta*.

719. PAO, W. K. and
LI, H. W. 633.11:576.356.5:575.114

On the inheritance of pentaploid wheat hybrids. A critique.

Acta Brevia Sinensia 1944 : No. 7 : 21-22. (Abst.). (Mimeographed.)

This mathematical analysis of the behaviour of the meiotic chromosomes of pentaploid wheat as reported by the Japanese investigators Kihara and Matsumara has been reviewed already (Cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 185).

720. KNEEN, E. and 633.11:581.142:577.15
HADS, H. L. 633.16:581.6

Effects of variety and environment on the amylases of germinated wheat and barley.

Cereal Chem. 1945 : 22 : 407-18.

The amylase activities of the grain of the hard red winter wheat varieties, Nebred and Blackhull, and the barley varieties Spartan, Trebi, Club Mariout and Flynn, were estimated. In both cereals the β -amylase activities of the ungerminated grain and the α - and β -amylase activities of the germinated grain were found to depend upon both variety and environment. Certain varieties appear to be definitely superior to others for the development of amylase in malting, but varietal differences were not great.

721. 633.11:581.162.4:575.12

633.11-2.111-1.521.6:575.12(47)

633.11:575.127.5:633.14(47)

PONOMARENKO, F. A.

(The role of selective fertilization in the winter hardiness of the Siberian wheat Skala).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
1941 : No. 1 : 10-19.

Winter wheat has been grown uninterruptedly on the Skala collective farm in the Irkutsk province, where frosts of as much as -50° C. occur in December and January. The Skala wheat constitutes a very mixed population of different forms of *Triticum vulgare*; the majority belong to var. *milturum* but var. *ferrugineum* is present as an admixture; there is also 1-2% of rye.

A number of well grown plants were selected and on each plant four ears were emasculated; two of them were pollinated artificially with pollen from another variety and the other two were left to pollinate naturally. Seed from ordinary plants not emasculated was taken as control. The survival was best in plant from seeds from free pollination, where it varied from 55.0 to 65.9%, as compared with 39.3 to 41.6 in those from artificial cross pollination and 30.9 to 34.8 in the controls. These differences are ascribed to selective fertilization on the part of the emasculated plants pollinated freely.

Although the original population contained only 1-2% of rye plants, the progeny of var. *milturum* proved to have as many as 28% of wheat-rye hybrids. This again is ascribed to selective fertilization and an "urge" on the part of the *milturum* to increase its winter hardiness.

The awnless var. *milturum* produced entirely unawned progeny both from free pollination and from pollination with var. *ferrugineum*. On the other hand the progeny of var. *ferrugineum* from free pollination was all awned whilst after crossing with var. *milturum* 83% of the progeny were awned and 17% awnless. These results are viewed as further evidence of the prevalent influence of the maternal parent and a further refutation of the Mendelian laws.

The rise in winter hardiness resulting from free pollination cannot be ascribed to the presence of the wheat-rye hybrids in the progeny, since it is evident even in families which contain no such hybrids. In a large-scale experiment where 4000 ears were emasculated and left to free pollination, an increase of 9.2% in winter survival was obtained with half the seeds sown on soft soil, and of 21.1% with the other half sown on newly ploughed-up rough land.

722. KNJAGINIČEV, M. I. 633.11:581.192:575.127.2

(The accumulation and the physicochemical properties of the protein in the grain of different species and varieties of wheats).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
1940 : No. 5 : 118-32.

Observations have shown that though methods of cultivation may partly mask differences in the protein content of wheat species, varieties still retain their individual reaction to manuring.

The author has studied (1) the relation between the content of different proteins and the physical properties of the gluten in various wheat species; and (2) swelling and fluidity of the glutens of wheat species.

In view of the relatively high stability of the physicochemical characters of the gluten in *T. monococcum*, *T. dicoccum* and *T. Spelta* under different experimental conditions, an analysis should be made of the quality of the gluten of interspecific hybrids of these species.

723. TAVČAR, A. 633.11:581.48:664.641.016(43.94)
 Glasigkeit des Kornes und ihr Verhalten zu anderen Kornmerkmalen beim Weizen (*Triticum vulgare* L.) [**Vitreousness of the grain and its relation to other grain characters in wheat (*T. vulgare*)**].
 Poljod. Znanstvena Smotra, Zagreb 1942 : No. 4 : p. 5.
 [From *Züchter* 1943 : 15 : p. 161].

Studies on 67 pure lines (including Prolifik and Somogy) of wheat showed *inter alia* that the variation in vitreousness of the grain may be of significance in the determination of the flour and baking quality.

724. SIBBITT, L. D. and HARRIS, R. H. 633.11:581.6:578.08
Comparisons between some properties of mixograms from flour and unsifted whole wheat meal.
 Cereal Chem. 1945 : 22 : 531-38.

It was found that for the estimation of varietal differences in mixing requirements mixograms obtained by using unsifted ground whole wheat meal are as satisfactory as those obtained from flour. Mixograms from flour however provided the more satisfactory indication of differences due to location.

725. ANODIN, P. 633.11-2.451-1.521.6:575.42(47)
(The breeding of spring wheat immune to smut).
 Sovhoznoe Proizvodstvo (State Farming) 1944 : No. 12 : 21-23.

It is explained how forms of *Lutescens* were obtained, in which the characters of high yield and good quality of the grain were combined with that of immunity to smut. The means to this end were not only selection and hybridization, but a process of immunization to which several generations of plants were subjected until the final product was immune to smut or nearly so. Immunization consisted in artificially infecting plants, and selecting those which succeeded in throwing off the infection and producing normal grain. It was thus possible for the plant breeder to avail himself of many desirable characters in varieties and forms which, without immunization, it might have been necessary to reject. I. Z.

726. WANG, T. H. 633.11-2.451.2:576.16:631.521.6(51)
(Inoculation experiments with loose smut of wheat).
 New Agric. J. Fukien 1942 : 2 : 396-403.

Two distinct physiologic forms of loose smut of wheat have been found. One, collected on common bread wheat, produced severe infection on the three common bread wheat varieties inoculated, Tsinghua 507, Tsinghua 519 and Tsinghua 540, but failed to attack the three varieties of *Triticum turgidum* inoculated, Tsinghua 383, Tsinghua 444, and Tsinghua 10187. The other, collected on *T. turgidum*, was pathogenic to the three varieties of *T. turgidum*, whereas the three bread wheat varieties showed great resistance to it. L. P. B.

727. WINGARD, S. A. and FROMME, F. D. 633.11-2.451.2-1.521.6(75.5)
Susceptibility of wheat varieties and selections to loose smut.

Tech. Bull. Va Polytechn. Inst., Agric. Exp. Sta. 1941 : No. 70 : Pp. 26.

The results of a study, begun in 1920, on the reaction of wheat varieties and selections to loose smut [*Ustilago Tritici* (Pers.) Jens.] in Virginia are described.

In inoculation experiments the variety Leap has been found to possess true resistance, while Stoner has proved susceptible.

Slight correlation was obtained between beardlessness and resistance to loose smut under conditions of natural infection, but not when the varieties were artificially inoculated.

Commercial varieties and pure line selections of Fulcaster, Fultz and Poole varied considerably

in their reaction to loose smut infection. Certain of the Fulcaster, Fultz and Poole selections showed a high degree of resistance only under conditions of natural infection. In field tests during 1936-40, 18 commercial varieties and selections gave consistently high resistance. Several of the Fulcaster selections which are the most resistant also give high yields; among these selections F-h-6 is particularly promising, and may be introduced to replace V.P. I. 131.

728. EL KHISHEN, A. A. and
BRIGGS, F. N. 633.11-2.451.3-1.521.6:575.11

Inheritance of resistance to bunt (*Tilletia caries*) in hybrids with Turkey wheat selections C.I. 10015 and 10016.

J. Agric. Res. 1945 : 71 : 403-13.

Previous investigations have indicated the existence of four major genes for bunt resistance; these factors, named after the variety in which they are found, are the Martin, Hussar, Turkey and Rio factors. Further data have been obtained on the inheritance of bunt resistance from a study of the F_2 and F_3 generations of crosses of the resistant selections Turkey 10015 and Turkey 10016 with the susceptible Baart variety, the four tester varieties Martin, Hussar 1403, Turkey 3055 and Rio, and with each other.

The data indicated that in Turkey 10016 bunt resistance is determined by two strong factors and one weak factor. The two strong factors were identified as the Turkey and Rio factors. The weak gene pair, designated XX, allowed 25% bunt infection when homozygous for resistance.

The genetic analysis of Turkey 10015, whose bunt resistance is slightly lower than that of Turkey 10016, was less conclusive. This selection does not carry any of the four major factors or any strong factor. It does, however, possess the weak X factor, since no segregation occurred in the cross with Turkey 10016. On the basis of the segregation observed in the F_3 of Turkey 10015 x Baart, it is suggested that an additional weak gene, designated Y, is also present, permitting 45% infection when homozygous for resistance. Some indication has been obtained that the Y gene is linked with the Martin, Turkey and Rio genes which have previously been found to be linked with each other (*cf. Plant Breeding Abstracts*, Vol. X, Abst. 1017 and Vol. XI, Abst. 956).

729. VOLOSKY YADLIN, D. 633.11-2.452:576.16:631.521.6(83)

Identificación de razas fisiológicas del *Puccinia graminis tritici* y *P. triticina*, algunos estudios efectuados en Chile. (Identification of physiological races of *P. g. tritici* and *P. triticina*, some investigations made in Chile). Agric. Tec. Chile 1945 : 5 : 70-78.

The presence in Chile of races 11, 14, 15 and 17 of *P. g. Tritici* has been confirmed. Five wheat varieties, Kenya 117 K-16-A, Kenya 117 E-B-I-16, Kenya 117 I-5-F, Red Egyptian and McMURACKY appeared to be immune to a mixed inoculum of these races. Two new races of *P. triticina* have been discovered in Chile for the first time, viz. 71 and 85.

730. TANG SIANG-YU and
LI CHIA-WAN 633.11:664.641.016(51)

Studies on kernel characteristics of different varieties of wheat with reference to bread quality.

Nanking J. 1942 : 11 : No. 3. (Abst.).

[From Acta Brevia Sinensia 1944 : No. 6 : p. 8. (Mimeographed)].

A two-years' study of the bread-baking quality of 33 varieties and strains has been made in Chengtu, Szechuan. Several varieties and strains possess a better baking quality than the local variety. It was found that the time of wheat meal fermentation is highly correlated with test weight per bushel and with percentage of vitreous kernels. High correlation also exists between the test weight and percentage of vitreous kernels. It is pointed out that in view of its high correlations with these two characteristics, the time of wheat meal fermentation is valuable to the breeder as a reliable means of estimating quality.

731. ROEMER, T. 633.11:664.641.016:575

Erzeugung von Qualitätsweizen. (Production of high quality wheat).

Forschungsdienst 1942 : Shft 16 : p. 368.

[From Züchter 1943 : 15 : 161-62].

The use of spring wheats in hybridization of winter forms has resulted in clear transgressive forms as regards winter-hardiness. Gluten characters and the tendency to germination in the ear are also important characters in breeding. Many improved pedigree strains from Weihestephans have now been included in the government evaluation trials.

732. AITKEN, T. R. and FISHER, M. H. 633.11:664.641.016:578.08
Mixing tolerances of varieties of hard red spring wheat.
 Cereal Chem. 1945 : 22 : 392-406.

It has been found that the curve obtained by plotting loaf volume against mixing time is a varietal characteristic. It is considered that the curve will be valuable in the routine testing of selections.

733. KNJAGINIČEV, M. I. 633.11:664.641.016:578.08(47)
(On the importance of variety in raising the protein content of the grain of wheats in the regions of the U.S.S.R.).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record) 1940 : No. 3 : 117-30.

The indicators of quality in wheat grain and flour are examined. The writer recommends the bromate method of baking test for determining the relation between the protein content of the flour (grain) and the loaf volume.

The effects of climate, methods of cultivation, and variety upon protein content of the wheat grain are examined, findings in the U.S.S.R. being given special consideration with regard to varietal differences in the main regions of that country. According to the author the grain of *durum* and *vulgare* wheats is practically the same as regards protein content. Three-year tests are sufficient for investigating the protein content of varieties for most regions.

Response to soil fertility is a generic character of wheat. Climate is not the main determining factor of the protein content of the grain.

Hybridization combined with selection for protein, selection of suitable varieties, or intergeneric crossing with plants whose grain contains gluten-forming protein are suggested as means of raising the protein content of varieties for regions in the U.S.S.R.

734. ELIASSON, S. and JACOBSON, G. 633.11.00.14(48.5)
 633.14.00.14(48.5)
 Sortförsök med höstsäd. Sammanställningar av resultaten av de av jordbruksförsöksanstalten ledda försöken med höstvetete och hösträg under åren 1939 (1929)—1943. [Variety trials with autumn sown cereals. A collocation of the results of the variety trials of winter wheat and winter rye conducted by the Agricultural Experiment Station in 1939 (1929)—1943].

Medd. Lantbr. Jordbruksförsöksanstalten 1945 : Nr 13 : Pp. 199.

A further report is presented on the same lines as the earlier ones already reviewed (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 166). Most of the varieties tested were bred at Svalöf or Weibullsholm. Information is provided on the origins of the different varieties from these two centres and from other Swedish or foreign sources, with genealogical tables for wheat and for rye showing origins and interrelationships between the different varieties. (Cf. Absts 602 and 697).

735. 633.11.00.14(48.9)
 Meddelelser fra Statens Forsøgsvirksomhed i Plantekultur. Forsøg med Hvedesorter. 1936-40. (Reports on state research in plant cultivation. Experiments with varieties of wheat. 1936-40).
 Tidsskr. Planteavl 1941 : 46 : 165-69.

This is a report on Danish trials of Lawaetz Als, Pajbjerg Ideal, Trifolium Rekord, Abed, Svalöf 01157 B and other Danish and Swedish wheats, with notes on cold resistance and other agricultural characteristics.

736. MARUŠEV, A. I. 633.11.00.14:664.641.016(47)
(The quality of the grain from wheat varieties of the Institute compared with that of varieties from other plant breeding stations in the U.S.S.R.).
 Bjuulleten; Instituta Zernovogo Hozjaistva Jugo-Vostoka S.S.S.R. (Bull. Inst. Grain Husb. S.E. U.S.S.R.) Saratov 1945 : No. 3 : 29-34.

In the six tables contained in the article, about 46 varieties are compared in respect of loaf volume per unit of flour, porosity and colour of the crumb, gluten content and thousand corn weight.

I. Z.

737. OMLJČENKO, V. K. 633.12:575.42:575.3
(On the conditions determining reliable and high yields of buckwheat).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : Nos. 3 : 59-66.

The author reviews the theories that have been put forward to explain the frequent inadequate yields of seed from buckwheat and he concludes that buckwheat is very sensitive to environmental conditions; and the experience of breeders and other workers with varied material and in different geographical localities shows that the best yields are obtained from varieties when grown each in their own locality. This view and also the great importance of variety in ensuring regular high yields under favourable conditions of cultivation and weather are supported by his experiences with his selected variety Althausen No. 11. Other varieties, Bogatyryj and Bolshevik, gave similar results.

The main way to obtain higher yields from buckwheat is by selection of varieties suited to the various regions, combined with good cultivation. Favourable weather conditions are also necessary.

Selection and breeding of new high yielding varieties should be based primarily on local forms or varieties from ecologically similar regions.

OATS 633.13

738. SHANDS, H. L. and
 LEITH, B. D. 633.13(77.5)
Vicland Oats.
 Bull. Wisc. Agric. Exp. Sta. 1944 : No. 462 : Pp. 15.

An account is given of the Vicland variety of oats (cf. *Plant Breeding Abstracts*, Vol. XI, Abst. 960).

739. MURPHY, H. C. and
 BURNETT, L. C. 633.13:575(77.7)
Clinton oats arrive.
 Farm Sci. Reporter 1945 : 6 : No. 4 : 3-7.

During the period 1938-45, the new variety Clinton, developed by the Iowa Agricultural Experiment Station, has outyielded Tama, Boone, Marion, Gopher and Richland. It has outyielded Tama, the highest yielding of these varieties during the period in question, by an average of 15 bushels per acre. Clinton is a medium tall, yellow, early variety. It is rust resistant and characterized by a very stiff straw.

740. WELCH, A. 633.13-2.411.4-1.521.6
***Pythium* root necrosis of oats.**
 Iowa St. Coll. J. Sci. 1945 : 19 : 361-99.

Investigations on the root blight in oats caused by *Pythium debaryanum* Hesse included the test of the reaction of 115 varieties to the disease. Six wild species were also tested, viz., *Avena abyssinica*, *A. ludoviciana*, *A. nudibrevis*, *A. Wiestii*, *A. barbata* and *A. sterilis*. The varieties Coast Black, Black Algerian, Early Red Rustproof, Red Algerian, Ruakura and Flughafer were the most resistant. Commercial varieties and wild species with $n = 21$ proved to be more resistant than those with $n = 14$ or 7.

RYE 633.14

741. KRASNJUK, A. A. 633.14:575(47)
(A new and promising variety of winter rye, Volžanka).
 Bjulletenj Instituta Hozjaistva Jugo-Vostoka S.S.S.R. (Bull. Inst. Grain
 Husb. S.E. U.S.S.R.) Saratov 1945 : No. 2 : 3-5.

The original material consisted of local varieties of Eliseevskaja rye, of which there were five groups from different localities, but having similar agricultural characters; varieties from other districts; and the best specimens of rye from various parts of the world. During 1939-40, 4910 cultures of these ryes, including 1630 cultures of the Eliseevskaja rye, were sown in a nursery where they were left to cross-pollinate. Individual plants were selected from these cultures, a new population of rye being thus produced in 1940; and after repeated selection in subsequent years, a new variety of rye was believed to have been produced, which was called Volžanka.

When compared with the yield of Saratov No. 1 during a period of three years, and at different places, that of Volžanka was consistently the higher. In regard to such characteristics as are expressed in terms of various plant counts and measurements, the new variety again compared favourably with the standard; the results of the observations are set forth in tabular form and relate to the number of plants per square metre, tillering per sq. m., the number of grains per ear, the percentage of gaps in the ear, the thousand corn weight, the hectolitre weight, the height of the plants, the length of the ear, and the density.

I. Z.

742. LAMM, R. 633.14:576.356.5:576.354.4

Chromosome behaviour in a triploid rye plant.

Hereditas, Lund 1944 : 30 : 137-44.

A description is given of meiosis in a triploid rye plant. The elimination of the unpaired chromosomes is estimated at 29.7%. In comparison with diploid plants the triploid form has a high chiasma frequency. The phenomenon of competition in chiasmata formation is discussed.

The pollen grains of the triploid were significantly larger than those of diploid rye. The triploid plant gave a high percentage of well-formed pollen grains, but was completely self-sterile, and crosses between the triploid plant as male parent and diploids were infertile. A few diploid progeny were obtained by using the triploid as the female parent.

743. WELLENSIEK, S. J. 633.14:581.162.32:581.165.1:578.08

Nieuwe methoden voor roggeselectie, met behulp van vegetatieve vermeerdering.

(New methods of rye-selection, with the aid of vegetative propagation).

Zaaizaad en Pootgoed 1940 : 2 : No. 7 : 9-11 ; No. 8 : 8-11.

The author, who has succeeded in maintaining rye clones alive for two years, here describes his method, and, from his work with rye, elaborates the advantages of vegetative propagation for cross-pollinated annuals. They include the possibility of (1) regulating the pollination and selection of the mother plants or clones on the basis of the performance of the sexual progeny; (2) preliminary selection of the mother plants before flowering, and stringent selection after; (3) obtaining large amounts of seed in comparing seedling families; and (4) crossing pairs of clones, thus providing a further control for pollination operations.

This vegetative method is recommended for rye (1) in crossing superior clones of different races; (2) in studying disease and pest resistance; (3) in experiments on the effect of pollen on grain size, on spacing in relation to pollen transference and, finally, on variation in the analysis of yield.

If the clones could be kept alive longer than two years the methods could be further improved; in this connexion vernalization might be profitably studied.

744. KOSTYUCHENKO, N. A. 633.14-2.111-1.521.6:575.12(47)

(Results of two years' work with winter rye in Kazakhstan and southern Siberia).

Vestnik Socialističeskogo Rasteniëvodstva (Soviet Plant Industry Record) 1941 : No. 1 : 3-9.

It is claimed that attempts to raise improved strains of winter rye by the accepted genetical methods, mostly involving selfing or close breeding, as they have been applied in Russia in the last 25 years, have resulted largely in failure. Tabulations are given showing that inter-pollination leads to yield increases varying from 0.5 to 8.19 centners per hectare as compared with ordinary stock seed produced in the normal way without inter-pollination. One exception was provided by the variety Omka, which flowers earlier than other varieties. The explanation offered is that in consequence of this, inter-pollination leads to fertilization mainly by plants of the same variety. Since 1939 selection work has been performed with the best races of local winter rye. The method employed was that recommended by T. D. Lysenko, where the race to be improved is permitted to exercise its capacity for selective fertilization by being left to open pollination in proximity to a number of other varieties. It is claimed that noticeable increases in winter hardiness have been obtained by this method.

The local rye Ključevskaja, which has arisen by natural selection in the Kulundinska steppe, proved one of the most winter hardy of all ryes and excelled all other varieties in yield in severe winter conditions; in grain size it was not much inferior to breeders' varieties such as Avant-garde.

Certain ryes which have been raised from self-sown plants found on abandoned fields have also excelled the cultivated varieties in winter hardiness, yield and size of grain.

745. JENKINS, M. T. 633.15:575(73)
Report of the First Northeastern Corn Improvement Conference
Connecticut Agricultural Experiment Station, New Haven, Connecticut
February 2-3, 1945.

Div. Cereal Crops Dis., Bur. Pl. Ind. Soils, Agric. Eng., Pl. Ind. Sta., Beltsville
Md 1945 : Pp. 21. (Mimeographed).

Brief reports are given of improvement work in field maize and sweet corn at each of the Agricultural Experiment Stations in the north-eastern region. A summary is included of an address by G. H. Shull on his early work on hybrid maize.

746. JENKINS, M. T. 633.15:575(76)
Report of the Fourth Southern Corn Improvement Conference Birmingham, Alabama, January 24-25, 1945.

Div. Cereal Crops Dis., Bur. Pl. Ind., Soils, Agric. Eng., Pl. Ind. Sta., Beltsville Md 1945 : Pp. 43. (Mimeographed).

Summaries are presented of maize and sweet corn improvement work at the experiment stations of various co-operating states.

A discussion on the problems of breeding maize for insect resistance referred to the earworm, weevil, the southern rootworm, and the European corn borer. R. A. Blanchard emphasized the importance of the earworm resistance exhibited by the silks of some lines, particularly in certain lines of flour maize. F. D. Richey considered the practical value of reported correlations between corn borer resistance and aphid resistance. In the discussion of the problems of breeding for disease resistance, *Helminthosporium turcicum*, *H. Maydis*, *Diplodia* stalk rot and charcoal rot (*Sclerotium bataticola*) received attention. A discussion of the sweet corn uniformity tests is also reported.

747. KEMP, W. B. and ROTHGEB, R. G. 633.15:575.114:575.41:575.125
Selection and genetic responses in a segregating maize population.
Bull. Md. Agric. Exp. Sta. 1943 : No. A26 : Pp. 33.

A study was made of the F_1 to F_7 populations of the cross between Reid Yellow Dent maize to Stowell Evergreen sweet corn, to determine under conditions of natural selection: (1) the amount of self-fertilization, (2) the behaviour of the kernel and other plant characters, (3) the genetic recombination of parental qualitative and quantitative characters, and (4) the vigour shown by the different genotypes in generations subsequent to the F_1 .

The amount of self-fertilization varied from 0-10%, with an average of 3.7%. Tiller number, and the proportion of plants bearing sugary kernels, white cobs or husk blades, decreased from the F_1 to F_7 generation, i.e. an elimination of characters introduced by the sweet corn parent occurred. The sweet corn character of higher number of ears per plant, however, tended to increase in successive populations.

The authors suggest that the genes Y and Su for yellow and starchy endosperm respectively are each completely linked with genes for vigour and that the genes y and su for white and sugar endosperm respectively are each incompletely linked with genes for ear number, and analyse the heterotic responses observed on the basis of this assumption.

748. ANDERSON, E. G. and RANDOLPH, L. F. 633.15:575.116.1:576.312.381
Location of the centromeres on the linkage maps of maize.
Genetics 1945 : 30 : 518-26.

The locations of the centromeres on the linkage maps of chromosomes 1-10 are given, mainly on the basis of the evidence obtained from a study of translocations.

749. ANDERSON, D. C. 633.15:575.12(77.8)
1942 report of the yield trials with corn hybrids and varieties in Missouri.

Manual Mo. Agric. Ext. Serv. 1943 : No. 30 : Pp. 15.

Data are reported for the yield per acre, moisture content of the grain, and root and stalk lodging of hybrids and open-pollinated varieties tested in Missouri during 1942.

750. JENKINS, M. T. 633.15:575.12(77.8)
The corn breeding program in relation to the war effort.
 Rep. 6th Corn Improv. Conf. N. Cent. Reg., St. Louis, Mo., November 12,
 1942 : 16-19. (Mimeographed).

The importance of hybrid maize in the production of food and war materials is analysed, and an account is given of the emergency measures taken to safeguard seed supplies and to maintain the maximum acreage of the best hybrids.

751. KIESSELBACH, T. A. 633.15:575.12:631.531.12:578.08
The detasseling hazard of hybrid seed corn production.
 J. Amer. Soc. Agron. 1945 : 37 : 806-11.

The removal of the tassel with and without loss of the leaves and the consequent smut infection occurring at the injured parts have been investigated for their effect upon the grain yield. The results found in the literature on the effects of detasseling practices upon grain yield are summarized. It appears that detasseling does not materially affect yield unless accompanied by loss of leaves or unless it induces a heavy attack of smut.

752. JONES, D. F. 633.15:575.242:575.125
Heterosis resulting from degenerative changes.
 Genetics 1945 : 30 : 527-42.

Several recessive mutations have been observed in inbred maize lines, which can be classed as degenerative variations, and the data suggests that they differ from the normal homozygous parent line by a single allele. The following mutant characters have been studied: narrow leaf, dwarfness, pale chlorophyll, crooked stalks, blotched leaf, and late flowering. In one line pale chlorophyll and crooked stalks occurred simultaneously and independently. Considerable heterosis, as measured by yield, plant height and earliness of flowering, was produced by crossing these degenerative forms with their respective normal parents.

The results are discussed with reference to studies by several investigators on the effect of the heterozygous condition upon yield and other plant characters. The author interprets heterosis as a cumulative effect of growth favouring genes derived from both parents. This effect results when only single gene differences are involved, provided these genes have pleiotropic effects.

753. BURKHOLDER, P. R.,
 McVEIGH, I. and
 MOYER, D. 633.15:577.16
Niacin in maize.
 Yale J. Biol. Med. 1944 : 16 : 559-63.

Information is given on varietal differences in the niacin content of maize.

754. WOUTERS, W. 633.15:581.162.3
 Contribution à la biologie florale du maïs. Sa pollinisation libre et sa pollinisation contrôlée en Afrique centrale. (**Contribution to the floral biology of maize. Its free pollination and its controlled pollination in central Africa**).

Publ. Inst. Agron. Congo Belge 1941 : Sér. Sci. No. 23 : Pp. 51.

An account is given of the floral biology of maize. The proportion of self-pollination under natural conditions at Gandajika varies from 5 to 11%, most of the fertilizations being effected by neighbouring plants.

The technique of controlled cross-pollination is described and its efficiency estimated.

755. MAZOTI, L. B. 633.15:581.483:575.11
 Contribución a la genética del maíz. (**Contribution to the genetics of maize**).

Rev. Argent. Agron. 1945 : 12 : 174-02.

Floury endosperm in South American maize varieties is variously determined. In varieties from Corrientes, Misiones and San Luis, all in Argentina, flouriness appears to be determined by the recessive gene *fl^a*, probably present in duplicate and allelomorphous with *fl₁*. Flouriness in maize from La Pampa and Santa Fe, both in Argentina, is determined by the recessive gene *ox*, also present in duplicate, which may be the same as gene *ox₂*. The Amilaceo-capia maizes from Bolivia

have floury endosperm determined by a duplicate recessive gene, not the same as fl^a , while some varieties from Los Andes in Chile appeared to have yet another type of genetically determined endosperm flouriness.

Xenia appears to affect the expression of flouriness, also the local biological environment of the developing grains, and the nature of the gene complex in which the principal genes are operating. Experiments were also made on the genetics of variegation. Clear evidence of extra-nuclear inheritance were obtained, and it was shown that, although chromosomal genes may initiate extra-chromosomal inheritance mechanisms, mutation of these genes may or may not modify the extra-chromosomal genetical systems.

756. BRIMHALL, B.,
SPRAGUE, G. F. and
SASS, J. E. 633.15:581.6:575.11

A new waxy allele in corn and its effect on the properties of the endosperm starch.

J. Amer. Soc. Agron. 1945 : 37 : 937-44.

The data indicate that the percentage of amylose and viscosity measurements of the endosperm starch are directly related to genotype, viscosity and amylose being inversely related. The allele wx^a determines the formation of a low percentage of amylose. On the basis of amylose synthesis the allele Wx for high amylose content shows dominance to wx^a and wx , the endosperm of the genotype $wxwxwx$ containing no amylose. In combinations involving wx and wx^a only, however, the variation in the percentage of amylose suggests geometric gene action. Data on the viscosity for all combinations indicate an additive gene action. The apparent pleiotropy of Wx , wx^a and wx is discussed in relation to the experimental procedure of estimating starch properties.

757. CARTER, G. F. and
ANDERSON, E. 633.15:581.9:576.16(73)

A preliminary survey of maize in the southwestern United States.

Ann. Mo. Bot. Gdn 1945 : 32 : 297-322.

An account is given of the collection of samples of modern maize from the south-western United States. Their classification has been based mainly on quantitative differences in cob shape, kernel size and row number, etc. One of the most important characters for classification was found to be the denting of the kernel, which is a genetic character known to depend upon a larger number of genes. Maize in the Southwest appears to have originated from at least four different sources: (1) the maize cultivated in the prehistoric Basket-maker culture; (2) varieties similar to but evidently not identical with (1), which are still grown by the Pima, Papago, Yuma and other tribes; (3) maize characteristic of the Mexican Plateau; and (4) maize distinguished by strong, arching leaves, coarse stalks, a large indurated shank below the ear, and an ear with the butt end larger than the rest of the kernel-bearing portion, occurring in the flint and flour types of the eastern United States. The characters of ear taper, row number and kernel denting were found to be correlated, and are referred to as the Mexican Complex; kernel width, shank diameter, enlarged butt to the ear and straight rows were also found to be correlated, and are referred to as the Eastern complex. A historical interpretation is given of the facts obtained.

758. JENKINS, M. T. 633.15-2-1.521.6:575(77)

Report of the Seventh Corn Improvement Conference of the North Central Region September 1-2, 1943 Lafayette, Indiana.

Bur. Pl. Ind. Sta., Beltsville 1943 : Pp. 13. (Mimeographed).

The seventh meeting of the Corn Improvement Conference of the North Central Region was devoted to problems of disease and pest resistance of immediate importance to the programmes of maize and sweet corn breeding. Leaf blight diseases received special attention. Mention is made of a discussion by E. G. Anderson on the technique of using translocations to study the inheritance of quantitative characters such as corn borer resistance. A. J. Allstrup presented data to illustrate the use of translocations in determining that the gene for susceptibility to race 1 of *Helminthosporium carbonum* is located in chromosome I. Among the matters discussed at the business meeting was the report of the Committee on the preservation of germplasm.

759. ULLSTRUP, A. J. 633.15-2.484-1.521.6(77.8)

The corn disease situation in 1942.

Rep. 6th Corn Improv. Conf. N. Cent. Reg., St Louis, Mo., November 12, 1942 : 20-21. (Mimeographed).

The occurrence of several diseases during 1942 is surveyed. *Helminthosporium* leaf blight was the most serious, and the reaction of commonly used inbred lines to this disease is indicated.

760. CHEU, S. P. 633.15-2.7-1.521.6(51)

(Correlation of corn borer damage with growth condition of corn and its significance on corn breeding work).

Kwangsi Agric. 1941 : 2 : 126-33.

The growth condition of the plant was found to determine largely the degree of corn borer infestation, the egg or the larval population showing significant positive correlation with plant height and stem diameter. It is therefore suggested that the actual yields of different plots in a variety trial may not be strictly comparable, and that use be made of the analysis of covariance. For the same reason it is further suggested that rate of survival of the larvae, as defined by the number of mature larvae per 100 eggs, may be a more accurate criterion of resistance than number of insects per plant or percentage of infested plants.

761. BAKER, W. A. 633.15-2.7-1.521.6:575(77.8)

The corn borer program for 1943.

Rep. 6th Corn Improv. Conf. N. Cent. Reg., St. Louis, Mo., November 12, 1942 : 29-31.

The aims of the recently developed programme for breeding corn borer resistance are discussed.

BARLEY 633.16

762. CAFFERA, R. 633.16(82)

Tipos y variedades de cebada. (Types and varieties of barley.)

"Granos" Semilla Selecta. B. Aires 1945 : 9 : Nos. 4-6 : 37-43.

Argentine forage and malting barleys are described and mention is made of the following four varieties: Massoux E.M. forage barley, and Trebi sel. Klein, La Previsión 19 and Malteria Heda malting barleys.

763. NILSSON-EHLE, H. 633.16:575(48.5)

Kornförädlingen på Svalöf 1926-1944 och dess resultat. (Barley breeding at Svalöf 1926-1944 and its results).

Årsb. Jordbruksforskning, Stockholm 1945 : 52-70.

This article follows the lines and content of the 1942 report (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 454) by the same author. Additional information of particular interest is set out below:—

Details of the performance of the malting barleys Ymer and Balder are given. The former has surpassed Kenia and equalled Maja in yield.

Malting barley breeding must now aim at producing varieties highly adapted to the different climatic zones that have been mapped out for Sweden.

Holmgren's crosses with Isaria at the Kalmar station have produced very promising forms which have done well in experiments there, but none are on the market yet.

Enströms Selecta, another promising malting barley, has done well in dry summers.

Still further advances in regard to malting barleys seem possible by hybridization and also with the aid of induced mutations.

Some new lines in the Ymer selection series may surpass Ymer itself and similar promising lines have also been obtained from its sister varieties, from the Maja and Freja cross among others.

New crosses with Ymer and other varieties may lead to even further progress, certain characters being still capable of improvement by various crosses with German and other foreign barleys.

The work of Svalöf and Östergötland to improve the fodder barley of the *nutans* type has been extended since 1935 (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 849) and with the greater concentration on particular characters and on special crosses now recommended, the initial material might well be raised to 50,000-100,000 plants.

The work at Ultuna has included Primus II x Opal crosses as well as the Primus II x Kenia crosses, previously mentioned.

In six-rowed barley breeding an attempt is being made to obtain resistance to nematode and diseases, increased yields and size of grain, etc., by extensive crosses of Brio with other 6-rowed varieties, with Asplund and with two-rowed barley of the *nutans* and *erectum* type (Brage, Kenia and Primus).

Selection in these crosses has given remarkable results, especially in the series Juli x Asplund, etc.; very high yield figures (up to 18% above Brio) have been obtained in combination with stiffer straw, larger grain and no reduction in earliness. Crosses with the above-mentioned two-rowed varieties do not seem to produce the desired results so readily, owing to the greater differences in the genotype. Still, promising lines have been selected out and repeated selection or else back-crossing to the best-six-rowed varieties seems likely to yield practical results.

The breeding of six-rowed barley for Norrland has been attended by considerable success. Crossing with Edda is being continued to render it still earlier or to make Stella stiffer strawed, higher yielding, while still retaining its quality.

Among the winter barleys the new variety 39-16 gave 3810 kg. of grain per ha. in 1942 in spite of the very severe winter. In 1938, which had specially favourable weather, Mansholt and a line from Mansholt x Pommerskt Nordland gave 7·200 kg. of grain per ha. Still further increases in hardness and stiffness of straw must be part of the breeding programme.

Barley improvement by chromosome reduplication and artificially induced mutations is being continued at Svalöf (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 510).

764. BAKHTEEV, F. KH. and
DAREVSKAYA, E. M. 633.16:575.127.5:633.289(47)

An intergeneric hybrid between barley and *Elymus*.

C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : 47 : p. 300.

A hybrid between cultivated barley and *Elymus* has been produced at the Institute of Grain Husbandry, Nemchinovka. No grains were obtained from crosses of *Hordeum nutans* Schübl. (8925) from Portugal or Kolkhoz-7 (*H. nudum* L.) with *E. arenarius* L. and *E. giganteus* Vahl. A single grain was, however, secured from the pollination of 44 flowers of the 2-rowed barley Wiener (*H. nutans*) with the pollen of *E. giganteus*. The plant raised from this seed tillered profusely and exhibited dominance of the habit of *Elymus*. Cytological studies have shown that the hybrid possessed 21 chromosomes, suggesting its true hybrid nature.

765. FREISLEBEN, R. 633.16:576.356.5

Untersuchungen an tetraploiden Kulturgersten. (Investigations on tetraploid cultivated barleys).

Forschungsdienst 1942 : Shft 16 : p. 361.

[From Züchter 1943 : 15 : p. 162].

By heat shock treatment at the first division, tetraploid barleys with various gigas characters were obtained, e.g. larger cells, thicker stems, broader and longer leaves, larger grains, and, in some cases, larger ears with coarser glumes and awns, as compared with the diploid type. On the other hand, tillering, length of stem and number of spikelets per ear as well as the set of grain and pollen fertility were reduced. Germination and early development of the tetraploid seed is slower but the interval between shooting and maturity was about the same as for the diploid. In tetraploids the osmotic pressure of the cell sap is lower, the chloroplasts are larger and the chlorophyll content possibly somewhat higher.

Cytological investigations suggest that plants with fewer multivalents with better fertility might be found.

766. SIMONET, M. and
FARDY, A. 633.16:576.356.5:581.04

Tétraploïdie chez l'orge nue à deux rangs (*Hordeum distichum* L. var. *nudum* L. $2n = 14$) provoquée par l'action de la colchicine sur le coléoptile. [Tetraploidy in two-rowed hull-less barley (*H. distichum* L. var. *nudum* L. $2n = 14$) induced by the action of colchicine on the coleoptile].

Rev. Sci. 1943 : 81 : 453-54.

The coleoptiles of germinating seeds of *H. distichum* L. var. *nudum* L. ($2n = 14$) were treated with colchicine in the first stage of growth. From the two lots of 50 seedlings treated, three completely tetraploid plants were produced, two with a 0·5% colchicine solution and the third with a 1% solution. The percentage of well-formed tetraploid pollen grains was 80-90%; the

tetraploid pollen grains were twice the size of the diploid. Grain from the tetraploid ears was much larger and more elongated than grain from the control ears. The morphology and meiosis of the F_1 generation are to be investigated.

767. POPE, M. N. 633.16:581.43:581.142

Seminal root number in cultivated barley.

J. Amer. Soc. Agron. 1945 : 37 : 771-78.

Seminal or temporary root formation was studied in 73 barley varieties, representing *H. distichon* L., *H. intermedium* L., *H. vulgare* L., *H. deficiens* Steud., *H. irregulare* E. Åberg et Wiebe, and *H. spontaneum* C. Koch. Seminal root number was found to be a varietal characteristic. Examination of a single strain of a natural tetraploid of six-rowed barley indicated that doubling of the chromosome number does not affect seminal root formation. No correlation was obtained between seminal root number and malting quality.

768. MA, R. H. 633.16:581.46

(The yield and quality trials of smooth-awned barley varieties).

J. Agric. Ass. China 1944 : No. 177 : 63-75.

In respect of yield, plant and seed characters, disease resistance, and feeding quality, the seven smooth-awned barley varieties tested, Regal, Comfort, Glabron, Velvet, Spartan, Newal and Wisconsin Barbless No. 38, have shown no inferiority to the rough-awned varieties. Their only defect is late maturity.

L. P. B.

769. KARNAUHOV, I. P. 633.16:581.48:578.088

(New methods of identifying varieties of barley by the grain).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record) 1940 : No. 5 : 109-17.

Phenol, hydrochloric acid, sulphuric acid and alkali were the reagents used in this experiment with various barley varieties.

A detailed account of the methods and results is given.

All the two-rowed barleys tested except Colchicum 10/30 and Medicum 26 reacted to phenol by a darker colour than the summer six-rowed forms, grown under optimum conditions. Three winter barleys Krasnyi Dar and Pallidum Nos 135/3 and 761/3 out of the four tested reacted with a dark brown colour which persisted, thereby differing from all the summer six-rowed varieties grown under optimum conditions.

Phenol staining could be used in practice for identification of barleys by control organizations. Some similar distinctive colorations were obtained with the other two reagents.

770. BURKART, A. 633.16:582(82)

Noticia sobre dos variedades de cebada desnuda, cultivadas en pequeña escala en la Argentina. **(Note on two naked barley varieties cultivated on a small scale in Argentina).**

Rev. Argent. Agron. 1945 : 12 : 216-21.

A short account is given of the taxonomy and synonymy of the Argentine naked barleys, which are here classified under the varieties *coeleste* and *trifurcatum* of *Hordeum vulgare* L.

771. ARNY, D. C. 633.16-2.484-1.521.6:575.11

Inheritance of resistance to barley stripe.

Phytopathology 1945 : 35 : 781-804.

Tests for reaction to barley stripe (*Helminthosporium gramineum* Rabh.) were made in the F_3 generation and also to a limited extent in the F_1 , F_2 and F_4 of crosses involving the highly resistant varieties Persicum and Brachytic, two resistant selections of Lion, and the highly susceptible varieties Oderbrucker, Colsess IV and Iris. In the cross Persicum x Iris stripe resistance was dominant; in the cross Colsess IV x Brachytic resistance was partially dominant. In these two crosses one pair of major factors and one pair of modifiers appeared to determine reaction to the disease. In the cross Lion x Oderbrucker resistance showed partial dominance, while in the crosses of Persicum and Brachytic with Oderbrucker resistance was dominant. In the hybrids with Oderbrucker as one parent, three factor pairs probably control response to stripe. The data from the cross Persicum x Brachytic indicate that these varieties have some resistance factors in common. No linkage was found between reaction to stripe and several morphological characters.

772. ŠIBAĖV, P. N. 633.16:664.641.016

(The gluten of barley).

Zonajnyi Naučno-Issledovateljskii Institut Zernovoga Hozjaistva Nečernozemnoi Polosy S.S.S.R. (Zonal Res. Inst. of Grain Husbandry of the non-Black-soil Belt of the U.S.S.R.) Moscow 1945 : Pp. 10.

Barley is a widely dispersed crop in the U.S.S.R., and is grown in many parts where wheat is not grown. It is believed that if more information than is at present available were obtained about the quality and quantity of gluten to be found in different barley varieties, barley could be used in making bread. The present study was therefore undertaken in order to discover how barley gluten can be separated from the flour, and the quantity of it, present in the grain and flour, estimated. A method of separation is described, and the percentages of gluten in more than 20 varieties of barley are enumerated. It is hoped that, after further investigation of this kind, plant breeders will be able to produce varieties of barley containing enough gluten of a desirable consistency, which will enable porous and tasty loaves to be made of it.

The pamphlet ends with a short paragraph in which it is stated that between 3 to 10 per cent. of gluten occurs in certain varieties of Vjatka rye. The quality of this gluten is briefly compared with that of barley and wheat. I. Z.

773. 633.16.00.14:581.6(77.3)

Industrial evaluation of two barley varieties grown in 1939.

Malt Res. Inst. Madison 1941 : No. I : Pp. 64.

Industrial evaluation of two barley varieties grown in 1940.

Ibid 1942 : No. II : Pp. 67.

Industrial evaluation of two barley varieties grown in 1941.

Ibid 1942 : No. III : Pp. 59.

Industrial evaluation of two barley varieties grown in 1942.

Ibid 1944 : No. IV : Pp. 48.

The comparative study at the Malt Research Institute, Madison, Wisconsin of the standard varieties Wisconsin Barbless (Ped. 38) and Oderbrucker grown at two locations is reported for each of the years of 1939-42. Comparisons have been made for yield, crop quality, malting quality and the suitability of the malts for use in the brewing, distilling and food industries. The comparative investigations of these two varieties are to be continued for several years, and no attempt is made to make a final evaluation of the two varieties or to compare the results for four years.

MILLETS AND SORGHUM 633.17

774. JAKUŠEVSKIĖ, E. S. 633.171:575(47)

(Japanese millet as a new fodder and industrial crop).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)

1940 : No. 5 : p. 188.

This perennial cereal belonging to *Echinochloa frumentacea* (Roxb.) Link is used as a fodder for livestock in China, Japan, and India, and occasionally in the Soviet Far East.

In the course of the author's study of the world collection of Japanese millet at the Institute of Plant Industry, the new varieties 014 (awnless) and 039 (awned) which are early maturing and give a comparatively high yield of grain and fodder were obtained. They have been released and are now being grown as a new source of alcohol and since 1940 they have been included in the official variety trials of perennial grasses.

775. JAKUŠEVSKIĖ, E. S. 633.174:575(47)

(Prospects of raising sorghum in arid regions of the U.S.S.R.).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)

1940 : No. 5 : 178-80.

As a result of extensive selection with sorghum, begun in 1926, 12 new varieties of sweet sorghum, grain sorghum and broom corn were produced by 1940. Of these the best for arid or even semi-desert regions is Palestine grain sorghum, raised from specimens obtained from Palestine and

Syria. More recently breeding operations have resulted in the production of over 20 new varieties, of which the ten best have been released for economic use. Among the desirable features of the varieties raised by the Institute of Plant Industry are early maturity, high output of silage, grain or panicles, suitability for mechanized harvesting, resistance to smut and wind damage, high starch content in the grain and a low cyanoglycoside content in the fresh green stuff which is therefore suitable for green fodder and grazing. Seed is being distributed annually through various channels. Cultivation problems still need attention.

776. QUINBY, J. R. and 633.174:581.162:575.11"793"
KARPER, R. E. 633.174:581.143.26.035.1:575.11
The inheritance of three genes that influence time of floral initiation and maturity date in milo.

J. Amer. Soc. Agron. 1945 : 37 : 916-36.

As a result of crossing certain milo strains, four phenotypes, viz., early, intermediate, late and ultra late, have been obtained, which represent eight genotypes of various combinations of three independently inherited genes, designated *Ma*, *Ma*₂ and *Ma*₃.

Ma shows linkage with *Dw*₂, a gene determining internode length, and *Ma*₃ linkage with gene *B* for development of plant pigment.

The effect of the genes *Ma*, *Ma*₂ and *Ma*₃ upon photoperiodic response was investigated.

In plants grown under normal photoperiods, the number of leaves, duration of growth and mature plant size were controlled by the time of floral initiation. The study of the inheritance of maturity in sorghum is thus essentially one of the inheritance of genes conditioning the biochemistry of floral initiation.

The effect of the three genes upon adaptation is discussed.

RICE 633.18

777. RU, S. K. and
CHU, T. L. 633.18:581.02
(Effect of row distance, hill distance and number of plants per hill on the yield and some other characters of rice).
J. Agric. Ass. China 1944 : No. 177 : 9-42.

Experimental results are presented and discussed for the effect of different combinations of row distances, hill distances and numbers of plants per hill on rice. L. P. B.

778. LIN, C. Y. and
CHEN, H. K. 633.18:581.143.26.035.1
(Effect of photoperiodic treatment on the growth of rice).
Fukien Agric. J. 1942 : 4 : 93-123.

The vigour of plants, tillering capacity, plant height, and time of maturity of rice were found to vary with different photoperiods. L. P. B.

779. LIU, T. T. 633.18:581.162.51:576.354.4:575.12
The nature of hybrid sterility between "*Oryza japonica*" and "*Oryza indica*."

Acta Brevia Sinensi 1944 : No. 8 : p. 17. (Mimeographed).

From an investigation of the causes of the variable degree of pollen abortion shown by hybrids between the two sub-species *japonica* and *indica* of *Oryza sativa*, depending upon the varieties used, it was concluded that the cause of sterility is post-meiotic, since meiosis was found to be completely normal.

780. PAN, C. L. and
KUNG, P. 633.18-1.557(51)
(Cultural factors affecting the yield of rice).
New Agric. J. Fukien 1942 : 2 : 320-29.

Based on experimental data, an account is given of the significant effects of rate of seeding, date of sowing, and date of transplanting upon the yield of rice. L. P. B.

OTHER CEREALS 633.19

781.

CEVALLOS TOVAR, W.

La Quinoa—el centeno. (**Quinoa-rye**).

Publ. Univ. Autón. Cochabamba, Cuad. Agric. 1945 : Nos. 6-7 : Pp. 32.

The Bolivian varieties of quinoa (*Chenopodium Quinoa*) and millmi (*Amaranthus* sp.) are discussed with special reference to their nutritive value. An outline of the processes involved in their cultivation is given. The author also deals with the cultivation of rye (*Secale*) in Bolivia.

J. G. H.

633.19(84)

633.14(84)

FORAGE GRASSES 633.2

782.

BERKNER, F.

Züchtung und Auslese von Futterpflanzen. (**Breeding and selection of fodder plants**).

Forschungsdienst 1942 : Shft 16 : p. 425.

[From Züchter 1943 : 15 : p. 164].

633.2/3:575(43)

633.42:575(43)

Results are recorded on the breeding of hairy vetch, winter peas, winter rape, *Astragalus*, *Pisum arvense*, *Vicia sativa*, *Lathyrus*, serradella and clover-like fodder plants such as sainfoin. Strains of hairy vetch that are more winter hardy were obtained in Klein-Blumenau. Reasons were found for its low seed yield in the Munich district. In the same region a specially early winter rape with increased yield was produced.

783.

BROUWER, W.

Züchtung und Auslese von Luzerne, Rotklee, Gelbklee, Hornklee, Steinklee, Esparsette und Serradella. (**Breeding and selection of lucerne, red clover, birdsfoot trefoil, sainfoin and serradella**).

Forschungsdienst 1942 : Shft 16 : p. 422.

[From Züchter 1943 : 15 : p. 164].

633.2/3:575(43)

In Jena the biology of the lucerne gall midge is being studied in connexion with the problem of resistance. In Müncheberg lucerne breeding is proceeding on the basis of isolation and combination of suitable inbred lines; the breeding of an acid tolerant lucerne is another objective. In serradella breeding at Berlin-Dahlem, in view of the difficulty of crossing, artificially induced polyploids of the different species are being tried in hybridization work. The polyploid plants have large organs and seeds. After a suitable infection technique had been evolved, forms were found that were resistant to *Colletotrichum Trifolii*.

784.

MOLOSTOV, A. S.,

POPRAVKO, A. V. and

SLIPČENKO, E. K.

(**Plant breeding and seed production**).

Naučnyi Otčet Moršanskoï Gosudar. Selekc. Stancii po Travam za 1941-1942

(Sci. Rep. Moršansk State Plant Breed. Sta. Herbage Crops 1941-1942) Ogiz,

Sel'khozgiz, Moscow 1945 : 9-42.

633.2/3:575(47)

An account is given of breeding and seed production at the Moršansk Station, where the following grasses and legumes are being improved: *Phleum pratense*, *Poa pratensis*, *Bromus inermis*, *Alopecurus pratensis*, *Arrhenatherum elatius*, *Agropyron repens*, red and Swedish clover and lucerne. What are described as the "anti-Darwinian" methods of breeding, practised by the adherents of Morgan and Mendel, are deprecated because their ultimate aim is a homozygous variety which, once obtained, is deemed to require only propagation and preservation from genetical impurity. The procedure of breeding at the Moršansk Station is designed to produce varieties which are not strictly homozygous. It has been found that maternal plants which are fertilized by pollen from a wide variety of chosen sources will transmit certain characters unimpaired, a fairly uniform type of plant being arrived at within a reasonably short time. Complete uniformity among the plants of a variety intended as a forage crop is neither expected nor desired; diversity is believed to be indicative of susceptibility to adaptation and improvement. Experiments are described which show that when heterozygosity was eliminated the yields of the component types were less than those of the original heterozygous variety, while free cross-pollination on the other hand resulted in a vigorous progeny.

785. NEWELL, L. C. and
 TYSDAL, H. M. 633.2/3:578.08:575
Numbering and note-taking systems for use in the improvement of forage crops.

J. Amer. Soc. Agron. 1945 : 37 : 736-49.

A method of numbering plants and seeds for use in the breeding of cross-pollinated forage plants is presented, the essentials of which are the designation of the year of seed production or plant selection and an index number indicating the breeding procedure or any other experimental treatment, the designations being prefixed to the serial selection number. The basic system is said to be broadly applicable in the breeding of any crop. A method for the numerical recording of comparative notes on breeding material is also described.

786. JULANDER, O. 633.2-2.112-1.521.6(73)
Drought resistance in range and pasture grasses.
 Plant Physiol. 1945 : 20 : 573-99.

Experiments have been carried out on several grass species to investigate: (1) the significance of heat resistance as a factor in drought resistance, (2) the effect of the carbohydrate supply on heat resistance, and (3) the effect of heavy grazing and clipping upon carbohydrate reserves, soil temperature and drought resistance.

Marked differences in heat resistance were found between the different species, buffalo grass [*Buchloe dactyloides* (Nutt. Engelm.)] and Bermuda grass [*Cynodon Dactylon* (L.) Pers.] being the most resistant. Heat resistance was found to depend upon accumulation of food reserves, and to be a satisfactory indication of resistance to natural drought conditions. Hardening by drought increased resistance to heat injury, drought-hardened plants having higher food reserves than unhardened plants. Accumulation of colloidal carbohydrates, particularly laevulosans, was associated with drought resistance. Over-grazed and heavily clipped plants did not produce food reserves during drought and were less resistant.

787. KELLER, W. 633.262:581.162.31:578.08
An evaluation of kraft and parchment paper bags for the control of pollination in grasses.

J. Amer. Soc. Agron. 1945 : 37 : 902-09.

A comparative study on the use of kraft and parchment paper bags in self-pollinated *Bromus inermis* Leyss. is reported.

788. SCOTT, L. B. 633.266-2.111-1.521.6(75.6)
Winter-fighting Wilmington narrow-leaf Bahia.
 Sth. Seedsman 1945 : 8 : No. 12 : 14, 30.

The narrow-leaved Wilmington strain of Bahia grass has shown outstanding winter-hardiness in comparison with the broad-leaved Wilmington and Pensacola strains. The strain was collected in North Carolina.

789. KLAGES, K. H. 633.282:575.42(79.6)
Idaho Amber sorgo.

Circ. Univ. Idaho Agric. Exp. Sta. 1944 : No. 97 : Pp. 8.

The use of the various sorghums under conditions in Idaho is discussed. Idaho Amber has been selected from Early Amber. It is early maturing, and shows satisfactory uniformity, resistance to lodging, and yield and quality of forage.

790. FRANZKE, C. J. 633.282:581.6:575(78.3)
Rancher, a low hydrocyanic acid forage sorghum.

Circ. S. Dak. Agric. Exp. Sta. 1945 : No. 57 : Pp. 8.

Rancher has only one-tenth of the hydrocyanic acid content found in other named varieties, and one-third of the content in Dakota Amber 39-30-S, which was released in 1937 as a variety with low acid content. It has been produced by crossing 39-30-S and 19-30-S, a strain with a high hydrocyanic acid content, and back-crossing to 39-30-S. Both strains were selected from Dakota Amber. Rancher is early maturing and medium in height. It tillers freely and gives good yields of forage and seed; it is adapted to all districts in South Dakota.

791. JOHNSON, B. L. 633.285:575.127.5:582
Natural hybrids between *Oryzopsis hymenoides* and several species of *Stipa*.
 Amer. J. Bot. 1945 : 32 : 599-608.

The following intergeneric hybrids of *Oryzopsis* and *Stipa* are described: *O. hymenoides* x *S. occidentalis*, *O. hymenoides* x *S. viridula*, *O. hymenoides* x *S. Elmeri*, *O. hymenoides* x *S. Thurberiana*, *O. hymenoides* x *S. californica*, *O. hymenoides* x *S. Scribneri*, *O. hymenoides* x *S. robusta* and *O. hymenoides* x *S. columbiana*. *O. Bloomeri* is not a satisfactory species, comprising merely a series of parallel hybrids between *O. hymenoides* and various *Stipa* species.

792. CLARK, M. 633.285:575.42(73)
Lo, a new buffalo.
 Sth. Seedsman, 1945 : 8 : No. 10 : 15, 50.

A description is given of the improved buffalo grass strain named Hays, developed by the Kansas Agricultural Experiment Station. It is resistant to heat, drought and cold, and is suitable as a forage crop in the region stretching from South Texas to North Dakota, for soil conservation and turf. A method of inducing high seed germination has been developed.

793. FRANZKE, C. J. 633.289:575.127.2:575(78.3)
Ree wheatgrass. Its culture and use.
 Circ. S. Dak. Agric. Exp. Sta. 1945 : No. 58 : Pp. 8.

Ree wheatgrass, a natural hybrid strain between *Agropyron intermedium* and *A. trichophorum*, is a new perennial grass for pasture and hay, released by the South Dakota Agricultural Experimental Station. The grass shows a fairly wide range of adaptability. It is cold resistant, and has greater resistance to drought and heat than brome grass. The hybrid strain is a good seed producer.

LEGUMINOUS FORAGE PLANTS 633.3

794. JAKUŠEVA, E. I. 633.3-2.111-1.521.6
(The winter hardiness of lucerne and clover and ways of increasing it).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : No. 5 : 54-65.

This paper deals with the effects of external and internal environmental factors and methods of harvesting upon winter hardiness in the two crops. Results obtained in various countries are cited.

795. AHLGREN, G. H. 633.31:581.43:575(74.9)
Breeding alfalfa to fit the soil.
 N.J. Agric. 1944 : 26 : No. 2 : 3-4.

The history of the introduction of lucerne into America is described and an account is given of breeding work devised to produce varieties adapted to the edaphic conditions of the north-eastern U.S.A. The synthetic variety Atlantic, which is a long-lived prolific variety with a firm root anchorage, has been recently introduced.

796. JONES, F. R. 633.31-2.111-1.521.6:581.49:575.42(73)
Winter injury and longevity in unselected clones from four wilt-resistant varieties of alfalfa.
 J. Amer. Soc. Agron. 1945 : 37 : 828-38.

The data indicate that under the conditions in question observations on winter injury and consequent infection by bacterial and fungus diseases should prove valuable in selecting for longevity.

797. LOWIG, E. 633.321:575
 Gedanken zur Züchtung und Samengewinnung von Wiesenrotklee. (**Considerations on the breeding and seed production of wild red clover.**)
 Züchter 1941 : 13 : 128-32.

Wild red clover (*Trifolium pratense* L. var. *perenne*) is distinguished by great variability in stemminess, in earliness, abundance and duration of flowering, in size, marking and colour of leaf, colour of flowers, in susceptibility to mildew and rust and in quickness of ripening of seeds. Characteristics distinguishing it from cultivated red clover are the low proportion of short-lived plants, shorter corolla tube and higher proportion of stemmy types with abundant flowers.

The variability of wild red clover is important in enabling it to fit into grassland communities over the widest range of local conditions. In producing seed it is important to avoid losing the variability. In comparative plots the best yield of seed was obtained from a pure stand of wild red clover. Simple mixtures with *Lolium perenne*, *Poa pratensis* or *Arrhenatherum elatius* gave poor yields of clover seed but all three species in combination allowed a substantial yield of wild red clover seed. Much better yields were obtained from the first cut than the second cut. To maintain the wild red characteristics it would be necessary to obtain stock seed either from permanent grassland or from single plants of established longevity. J. L. F.

798.

633.321:581.162.5:575(48.1)

WEXELSEN, H.

633.321:575.14:575.125:575(48.1)

Studies on fertility, inbreeding and heterosis in red clover (*Trifolium pratense* L.)

Norske Vid. Akad. Oslo Mat.-Naturv. Klasse, 1945 : No. 1 : Pp. 141.

A full account is given of the investigations on fertility, inbreeding and heterosis in red clover, carried out by the author since 1929 at the Felleskjøpets Stamsedgård, Vidarshov, Hjøllum. Local strains of Norwegian late red clover and selections of wild red clover from southern Norway have proved to be highly self-sterile, and no selfed lines could be secured.

Cross-incompatibility was found in lines highly inbred by sib-mating. The families fell into intra-sterile and interfertile groups as expected on the basis of the allelomorphous series of genes for sterility reported by other workers. The data indicate that at least fifteen S alleles are present in the common strains of red clover.

In general, inbreeding produced no adverse effect upon fertility, pollen quality, weight of seed or percentage of germination. Reduced seed yields were obtained as a result of inbreeding, this reduction being attributed mainly to the decrease in vegetative vigour and the smaller number of flower heads. The general depression in vigour due to inbreeding was evident in the early stages of seedling growth, appearing immediately after germination or at a somewhat later stage.

Considerable differences in vigour were found between inbred families, but no normally vigorous inbred plants were obtained. The reduction in vigour was greatest in the first inbred generation. Inbreeding resulted in a marked reduction in plant weight at the flowering stage, due mainly to decreases in the number of stems and internode length. Plant height was also reduced. In general the number of internodes was unaffected by inbreeding. Significant positive correlation was found between vigour and variability in stem number, indicating that the more vigorous families are the more heterozygous. Various abnormal recessive types were observed in segregating inbred families, including several chlorophyll deficient forms, dwarfs, a triple headed type, stemless plants and a type with glossy, partly rolled up leaves. In crosses between unrelated inbred families, pronounced hybrid vigour has been observed in the F_1 . Close correlation was not however found between inbred and hybrid vigour. The nature of the effects of inbreeding are discussed, and it is considered that the main facts obtained in studying inbreeding in red clover display most agreement with Müntzing's hypothesis.

A discussion is given of the use of inbred lines, with reference to self and cross fertility relationships and the effects of inbreeding. Inbred lines in themselves have no value in practical breeding. It is suggested, however, that selection of inbred lines for disease resistance, persistency, chemical qualities such as protein content, or tillering capacity, offers promise of improvement. Methods of combining desirable inbred lines in hybrid combination are discussed. Certain single cross F_1 families, obtained by crossing different strains, other F_1 families, or unrelated inbreds, have equalled or exceeded the standard variety in plant weight, but the majority of the open-pollinated progenies of these F_1 families have been inferior in yield to the standard variety in ordinary field trials. Tests are in progress of strains derived by crossing several F_1 families, from single crosses between inbreds, crossing promising F_1 hybrids between two inbreds on to a standard strain, and by crossing together a number of Scandinavian strains. Mass selection has so far given poor results, while the results of single plant selection indicate that selection of progenies is likely to give more satisfactory results.

799.

HOROŠAĬLOV, N. G.

633.361:575(47)

[The breeding of esparcet (sainfoin)].

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
1941 : No. 1 : 99-111.

An account is given of the characteristics and distribution of species and varieties of sainfoin

with special reference to the question of the economic value of *Onobrychis arenaria* in the U.S.S.R., where breeding operations have already produced more than ten new promising varieties, and in the Transcaucasian Republic special attention is being paid to seed production to prevent the practice which has prevailed of mixing local and imported European seed.

Investigations of the Institute of Plant Industry have established the Transcaucasian form of sainfoin as an independent species, *O. antasiatica* Khin., distinct from *O. transcaucasica* Grossh. and *O. altissima* Grossh.

Studies have been made on the time of flowering, habit, thickness of stem, plant height and number of tufts per stem in various species.

At the Kuban Experiment Station breeding has been in three ways. (1) Individual selection within varieties or population of mother plants, followed by bulking of the best progenies, has produced Transcaucasian No. 9696 which showed a yield increase of 6.3%. (2) Selection of the best mother plants with subsequent bulking of the best progenies resulted in a selection yielding 109.8 centners per ha. as compared with 94.4, the highest yield from the standard variety. (3) Interspecific crossing, which has been carried out in inter-station trials (including those of the Kuban Station), showed that the hybrids were intermediate between the parents species for many economic and biological characters, but no specially promising results are recorded.

800. HOROŠAĬLOV, N. G. 633.361:581.43:576.16
(The root system of sainfoin).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : No. 3 : 87-94.

Evidence from thinning operations at the Kuban Experimental Station indicates that the *Onobrychis* species differ in the ease with which they can be pulled up or trimmed with the spade and therefore in their root systems. In 1939 a further study of root systems in 15 varieties was undertaken at the station to verify this difference and to estimate the causes of varietal differences in drought resistance. The existence of specific differences in form and colour of the root was confirmed in *O. viciaefolia*, *O. antasiatica* and *O. arenaria*, but there were not enough data to ascertain whether varietal differences also existed. Under drought conditions *O. inermis* and *O. arenaria*, both late maturing forms, ranked first in yield, whereas in a wet year the highest yield was obtained from a Transcaucasian and a European variety. In *O. viciaefolia* (European type) the root system is more superficial while in *O. inermis* and *O. arenaria* it is well branched and reaches a good depth in the soil. *O. antasiatica* is intermediate as regards both these features. These findings have importance for the breeder.

801. 633.361-1.521.5(47)
 635.65-1.521.5(47)
 633.85-1.521.5(47)
(The material for compiling manuals, by regions and republics, relating to certification of cereals, legumes and oil bearing crops).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : No. 3 : 149-54.

Instructions are given on the type of information required and the way in which it should be set out in compiling manuals on the certification of varieties of wild perennial millet, legumes and oil crops.

802. SQUIBB, R. L. 633.365(72.86)
Desmodiums—"Alfalfas of the tropics".
 Agric. Amer. 1945 : 5 : 151-53.

An account is given of experiments carried out by the Inter-American Institute of Agricultural Sciences on the use of *Desmodium* spp. as forage crops. These legumes are rich in protein and highly palatable to livestock. *D. nicaraguense* contains 22% crude protein, when cut prior to maturity.

803. EVANS, M. and 633.366:576.356.5:581.04:575(73)
 JOHNSON, I. J.
The comparative rates of growth of tetraploid and diploid sweet-clover, *Melilotus alba* Desr.
 J. Amer. Soc. Agron. 1945 : 37 : 867-75.

Colchicine-induced tetraploids of sweet clover showed a superiority in plant size in comparison

with diploids only in the early stages of growth, and this superiority may be mainly due to greater seed size. The possible breeding value of tetraploid lines is discussed.

ROOTS AND TUBERS 633.4

804. LAMPRECHT, H. 633.4:575(48.5)
 Rotfruktsförädlingen och dess mål. (**Root crop breeding and its objects**).
 Årsb. Jordbruksforskning, Stockholm 1945 : 70–80.

A short characterization of the fodder beet and the swede is given with observations on their origin.

The maximum yield of fodder units per unit of area, freedom from bolting, keeping properties, high content of digestible protein, resistance to disease and parasites and also the yield and composition of the tops constitute the main objectives for the breeder.

A full description is given of the technique of breeding, comparative trials and élite seed production, applied to root crops, with useful explanations of the various stages in production, and also of continental terminology used in classing seed resulting from multiplication of élite seed. The possibility of improving élite seed in regard to a few characters such as disease resistance, cold resistance, keeping capacity and other features by artificial selection, is mentioned.

Similar information is given relating to swedes and turnips. Here an additional aim in breeding is to obtain roots that do not affect the flavour of the milk when given as fodder. Whether the elimination of the mustard oil, which causes the undesirable flavour, renders swede or turnip more susceptible to diseases presents a further problem for the breeder.

Hybridization and selection for club root resistance in turnips has already been attended with success, the old Norwegian variety Forus having been used as initial material. Resistant swedes may be obtained by crossing with the turnips. The attempt has been made and though the F_1 roots may have excrescences, the so-called "hybrid nodules", these outgrowths never break down or decompose like club root.

805. KRASOČKIN, V. T. 633.41:581.143.26:631.521.6:575.42(47)
 (**Breeding of beets resistant to bolting**).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : No. 3 : 77–86.

The problem of bolting in beets is discussed from the point of view of its apparent causes and methods of selecting for resistance to the defect, with numerous references to findings at various experiment stations in Russia and in other countries. The character shows not only varietal differences but also differences between families derived from a single plant, and commercial varieties of the Egyptian Flat beet are reported as showing marked differences in bolting and other economic features, in spite of morphological similarity of the plants. Bolting, which increases in more northerly latitudes, is also an important characteristic for consideration in other biennial vegetables intended for these regions.

Experiments have shown that early sowing is a most important factor in high yield from sugar beet, but that bolting constitutes an obstacle to the application of vernalization since it may induce shooting (up to 25%).

The Russian sugar beet varieties are generally not resistant to bolting. The most resistant commercial strains at Leningrad trials in 1937 and 1938 were those from the Ljgovskaja and Verhnjačskaja stations.

Both the internal (genotypic) and external conditions (low temperature and long day) favouring bolting must be taken into consideration in selecting for resistance. The best method is to provide conditions tending to promote bolting and eliminate the bolters in the population. Early sowings should be made in hot-beds and the resistant forms and biotypes selected out. Experiments on these lines with 70 specimens of different types of beet showed a range of from 100% susceptible to complete immunity. The highest resistance was exhibited by the Barres type Sljudstrup, a Scandinavian beet with a long vernalization stage, cylindrical Eckendorf Yellow and, of the garden beets, Severnaja V.I.R. (Northern I.P.I.), a hybrid from a cross of Egyptian Flat No. 18 with Bells Bleeding, while Oberndorf Yellow showed from 77 to 80% of bolters.

Native bred sugar beet varieties, judging from direct sowings in the field, are much more prone to bolting than the resistant fodder and garden beets tested.

806. SUN, V. G. 633.42:575.125
Hybrid vigor in *Brassica*.
 J. Agric. Ass. China : 175 : 35-58.
 [From Acta Brevia Sinensia 1944 : No. 7 : p. 23. (Mimeographed)].
 For an abstract of this paper see *Plant Breeding Abstracts*, Vol. XIV, Abst. 231.

807. FRANDSEN, K. J. 633.42:575.127.2:576.16
The experimental formation of *Brassica juncea* Czern. et Coss.
 D. Bot. Arkiv. 1943 : 11 : No. 4 : 1-17.

Amphidiploids with $n = 18$ were produced by crossing colchicine-induced tetraploids of *Brassica nigra* and *B. campestris*. The new interspecific hybrid has been named *B. pseudojuncea*. It closely resembles the natural species *B. juncea* in leaf shape, spreading siliques, shape of flower buds, flower size and anther length. The only substantial differences are shown in the size of the pollen grains, seed size, and fertility. The chromosomes of *B. pseudojuncea* are very nearly the size of those of *B. juncea*, and meiosis in the F_1 and F_2 and in the hybrid *B. pseudojuncea* x *B. juncea* was regular, except for the formation of 17 bivalents and two univalents in some cells. On the basis of these cytological and morphological observations, it is suggested that the natural species *B. juncea* probably arose as an amphidiploid between *B. nigra* and *B. campestris*.

808. SUN, V. G. and SZE, L. C. 633.42:576.312.35:575.12:582(51)
A note on "Tsontsai".
 Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 295-98.

This investigation has already been summarized (Cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1043 and Abst. 809 below).

809. SUN, V. G. and SZE, L. C. 633.42:576.312.35:575.12:582(51)
A note on "Tsontsai".
 Acta Brevia Sinensia 1944 : No. 7 : 23-24. (Mimeographed).

A description is given of tsontsai, a type of *Brassica juncea*, which has been named *B. juncea* Coss. var. *linearifolia* Sun. (Cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1043).

810. SUN, V. G. 633.42:581.331.2:582
A study on the size of pollen grains in the genus *Brassica*.
 J. Agric. Ass. China : 175 : 20-34.
 [From Acta Brevia Sinensia 1944 : No. 7 : 22-23. (Mimeographed)].

This study has been previously summarized (Cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 233).

811. SUN, V. G. 633.42:582
The evaluation of some taxonomical characters of the cultivated *Brassicas* and a suggested key for the identification of varieties and species.
 Acta Brevia Sinensia 1944 : No. 7 : p. 6. (Mimeographed).

A revised classification of the cultivated species and varieties of *Brassica* is presented. The following species are recognized: *B. nigra* Koch, *B. carinata* Braun, *B. oleracea* L., *B. napus* L., *B. campestris*, *B. chinensis* L. and *B. juncea* Coss. It is suggested that the *Brassica* species with $n = 10$ originated in two geographical centres, the western and the Oriental.

812. JEHL, R. A. and STEVENSON, F. J. 633.491:575(73)
The Potomac potato.
 Amer. Potato J. 1945 : 22 : 261-66.

Potomac is a new late maturing variety derived from the cross Rural New Yorker x Katahdin, suitable for planting in all districts in Maryland, and giving high yields of round white tubers. The haulms and tubers are moderately resistant to late blight, attack by flea beetle and leaf hopper, and to tipburn. The variety has shown satisfactory cooking quality for all purposes.

813. LINDSAY, M. A. 633.491:575(79.4)
Sectional notes. California.
 Amer. Potato J. 1945 : 22 : p. 289.

A description is given of the new variety Calrose, developed by a commercial firm in California,

which has shown promise in the 1945 potato crop. The variety produces a vigorous plant with a large root system and small Sebago-like leaves. It is blight resistant and in yield equals or exceeds White Rose. Calrose can be later grown and harvested, thereby extending the marketing season for new potatoes by at least 30 days.

814. 633.491:575.127.2(47)

BUKASOV, S. M. 633.491-2-1.521.6(47)

(The successes and failures of interspecific hybridization of the potato).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)

1940 : No. 3 : 39-48.

The problems of interspecific crossing in potato breeding and the elimination of undesirable characters are considered, with observations on the difficulties of combining *Phytophthora* resistance and early maturity and on the role of *Solanum demissum* in such work. Lack of genetic study of resistance and of the varieties used, the absence of *Phytophthora* resistant varieties among those already in agricultural cultivation and the inadequate scale on which breeding is conducted present further difficulties to the investigator.

Methods are examined: consecutive back-crossing is more effective than interspecific crossing and crossing of $F'_1 \times F'_1$ or $F'_2 \times F'_2$, introducing less of the undesirable characters of the wild species. Cytological research is also essential in interspecific hybridization. Diseases, degeneration, and the occurrence of physiological races are further factors to be contended with. The need for a single test collection, possibly from wild forms, for work on physiological races of *Phytophthora*, and the development of this branch of research on an international scale are stressed.

Though the biology of *Phytophthora* races has not been studied, there are grounds for believing that in the U.S.S.R., hybrids exist resistant to several races. Indirect evidence of the existence of such races in Korenevo is also afforded by the fact that the majority of *S. xitlense* seedlings and their F_1 hybrids from a Korenevo population were infected with the disease, whereas Lehmann states that *S. xitlense* is partially resistant. The biological races should be studied in the U.S.S.R. and also different *Solanum* forms, e.g. *S. demissum* and other resistant species. Breeders should also turn their attention to *S. Antipoviczii* and *S. ajuscoense*, which according to Lehmann comprise forms resistant to all races of *Phytophthora*. These species are also said to include seedlings in which the haulms contain no solanin. Moreover, *S. ajuscoense* and *S. Vallis-Mexici* surpass *S. demissum* in vigour and probably in yield of tubers; *S. Vallis-Mexici* is resistant to degeneration, and the hybrids of *S. Antipoviczii* have well-formed tubers. Cytological studies of the crosses of such species and some means of obtaining normal hybrids carrying the reduced gametes of the wild form would be necessary in breeding operations. Various difficulties in working with the triploid, *S. Vallis-Mexici*, and the tetraploids (*S. Antipoviczii* and *S. ajuscoense*) are mentioned.

The very large number of plants required in breeding for forms containing no solanin calls for a rapid method of solanin determination.

Brief indications are given of how various South American species have been or could possibly be used in breeding work, or of defects preventing their use. The relative value of some species in breeding for resistance to various diseases besides *Phytophthora* and degeneration is discussed, the findings of German and other workers being cited.

The work that has already been done on resistance to the Colorado beetle, which has penetrated to within about 1000 kilometres of the Soviet borders, is also mentioned with special reference to the South American species. Owing to the absence of the pest in the U.S.S.R., Russian investigators would have to work abroad in infested regions or devise indirect biochemical methods of detecting resistance, as Trouvelot has already attempted to do. The difficulties and possibilities of obtaining forms resistant to Colorado beetle by hybridization of various species are briefly outlined.

In breeding for frost resistance artificial as well as natural conditions of low temperature have to be employed. The merits and defects of various species and combinations in such work are set out; and it is recommended that special attention should be paid to the groups of species surpassing *S. demissum* in frost resistance, namely *Acaulia* and *Commersoniana*. The author records that high frost resistance characterizes the whole collective species *S. Commersonii* (incl. *S. Ohrondii*, *S. Henryi*, *S. mechonguense* etc.), but that the members of the group *Commersoniana* that are not frost resistant, e.g. *S. laplaticum* and *S. Boergeri*, are systematically remote from *S. Commersonii*, and that there are also hybrid forms that are not frost resistant.

Work has been done in the U.S.S.R. with *S. Punae*, but only a few hybrids were obtained out of thousands of crosses and on back-crossing to *S. tuberosum* 72-chromosome hybrids were obtained with the wild characters and of no economic value. A second back-cross resulted in a 60-chromosome progeny comprising frost resistant hybrids. To obtain a completely resistant variety further crossing with *S. tuberosum* is necessary.

The author inclines to the belief that the recorded increased crossability of *Acaulia* spp. with *S. tuberosum* is due to preliminary crossing of the different species of *Acaulia* *inter se* and the functioning of an unreduced gamete in the wild form.

The frost resistance of *S. acaule* is not correlated with wild characters and can be combined with productivity.

The triploid, *S. Millanii* possesses the greatest vigour of all the frost resistant wild species, so some way of eliminating its sterility must be devised.

815. *KAMERAZ, A. JA. 633.491:575.127.2(47)
(The use of the forms of *S. andigenum* Juz. et Buk. in potato breeding).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : No. 5 : 165-77.

The behaviour of hybrids of *S. andigenum* obtained at different times at the Krasnyĭ Paharj experimental station near Leningrad is described in full detail.

Crosses of *S. andigenum* x *S. tuberosum* produced some very high yielding F_1 hybrids surpassing both the original *S. tuberosum* form and some of the most productive domestic varieties. Some of the hybrids showed a high starch content, and some a low one; but even when *S. andigenum* forms with a low content, e.g. f. *usmense* or f. *hederiforme* were used in the cross, it was possible by using a suitable domestic variety as the other parent to obtain F_1 plants with a higher content than the *S. tuberosum* parent.

The most successful combination of *S. andigenum* with Chilean forms of *S. tuberosum* was *S. tuberosum* f. *Murta* x f. *funzanum*, from which many seedlings with a yield of up to 1325 grm., a starch content of 19.5% and tubers of pleasing appearance were obtained.

Though a scattered cluster was dominant in the F_1 of *S. tuberosum* x *S. andigenum* in some combinations forms with compact clusters segregated out. Occasionally hybrids with uniform clusters were also found. Among the forms which gave hybrids with larger tubers were f. *tocanum*, f. *usmense*, var. *hederiforme*, var. *Herrerae* f. *Utuc-runtun*, var. *ccusi*, var. *Imilla*, var. *bolivianum*, etc.

Tuber shape varied greatly but some combinations characterized by oval and long oval shape included var. *longibaccatum* and especially its form *Cevallosii*.

Other features studied in this group were depth of eye, tuber colour, rate of ripening of the tubers, berry formation, resistance to *Phytophthora*, degeneration and frost.

As compared with the F_1 , the F_2 hybrids offered no particular advantages for practical breeding; back-crossing to *S. tuberosum* is necessary, and, with proper selection of the components, may yield forms combining high yield and high starch content with other desirable characteristics of *S. tuberosum*.

Crosses involving *S. demissum* and *S. andigenum* as well as *S. tuberosum* are being studied. Some promising results have been obtained and will be published in greater detail in a future paper dealing with *S. demissum*.

816. KAMERAZ, A. JA. 633.491:575.127.2(47)
(Wild Chilean species *S. leptostigma* Juz. and *S. Molinae* Juz. in potato breeding).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1941 : No. 1 : 180-87.

In attempting to breed potatoes of practical value *S. leptostigma* and *S. Molinae* crossed with *S. tuberosum* should offer the most promising combinations, hybrids being fairly productive and often having a high starch content. The first two species, and *S. leptostigma*, in particular, are specially valuable on account of their drought resistance. Jubel x *S. Molinae* is incidentally mentioned for its tolerance to heat.

Though the F_1 from crosses of *S. leptostigma* or *S. Molinae* with *S. tuberosum* were in some cases

* A translation of this paper is on file at the Bureau.

drought resistant and gave moderate yields with a fairly high starch content, they were unsatisfactory in other respects not only in the F_1 but also in the F_2 and F_3 . Back-crossing is therefore essential.

Data are enumerated and tabulated showing the main economic characteristics of hybrids of Chilean wild species with domestic forms on back-crossing with *S. tuberosum*. It would appear that the best combinations in the selection of forms with the *tuberosum* complex of economic characters should be those in which *S. Molinae* or *S. leptostigma* are back-crossed three times with *S. tuberosum* forms.

The following combinations, involving three to four species including Chilean wild species, have been used in endeavouring to obtain forms with high starch content and large starch granules in combination with *Phytophthora* resistance: (1) *S. demissum* x *S. leptostigma* (or *S. Molinae*) crossed with Centifolia, Flavia, Goldstärke or Katahdin; (2) F_1 (Courier or Fürstenkrone x *S. demissum*) x F_1 (Pepo x *S. Molinae*); (3) [(*S. demissum* x *S. Molinae*) x Katahdin] x Verra; F_2 (*Parnassia* x *S. leptostigma*) x F_1 , F_2 or F_3 (*S. demissum* x *S. andigenum* var. *bolivianum*). Though some of these combinations were *Phytophthora* resistant in the field and showed a tuber yield up to 1050 grm. and in some cases high starch content, e.g. 25%, they lack valuable economic features and are of no practical importance. They have, however, a certain interest in regard to future crosses with *S. tuberosum* to obtain forms with high starch content, large starch granules and increased *Phytophthora* resistance.

817. BOZA BARDUCCI, T. 633.491:575.127.2:631.531.12

Plan genético para la producción de papas-semilla. (**Genetical plan for the production of seed potatoes**).

Bol. Estac. Exp. Agric. La Molina 1944 : No. 24 : Pp. 18.

The problem of seed production is discussed under two heads: (1) the production of improved seed in the Andean zone, and (2) the annual supply of the potato growers in the coastal valleys, and especially the Lima department, with improved seed from definite Andean production centres. Under the first head the author considers the problem of breeding better types by using appropriate species and varieties indigenous to Peru. In this connexion the work of the Russian and other investigators on the Peruvian potatoes is reviewed. Under the second head are discussed problems of inspection and certification of seed and the establishment of experimental stations in various parts of the country.

J. G. H.

818. RAZUMOV, N. I. 633.491:575.127.5

(**Features in the development of plants from tubers obtained as a result of grafting**).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record) 1940 : No. 3 : 21-30.

Previous work on the subject is reviewed.

The object of the author's own experiments was to induce tuber formation in species of potatoes which do not form tubers under northern long day, by grafting on them scions of various members of the Solanaceae. The scions fell into three groups according to the readiness with which they promoted tuber formation in the stock: (1) rapid and abundant—*Solanum tuberosum*, *Datura*, egg-plant, *Anisodus luridis* and *Atropa Belladonna*; (2) slow and not very vigorous—tomato, *S. Rybinii* and tobacco; (3) very weak and slow—*S. nigrum*, *S. demissum*, *S. acaule*, and *Physalis*. The tubers obtained from the cultivated and the wild species did not in general differ morphologically, but, biochemically, they and the plants grown from them did show marked differences. Incidentally, grafts of *S. Rybinii*, whose tubers have not a high nitrogen content, on cultivated varieties were found to increase the nitrogen content of the stock.

Differences between the effects of the various scions, as exhibited in the vegetative progeny of the grafted plants, were studied in regard to length of resting period, energy of growth and disease resistance. The progeny from several cultivated varieties grafted with *Datura* were less affected by degeneration.

Plants of the first generation obtained by vegetative reproduction from *S. Antipoviczii* grafted with *Datura* and potato set seed by selfing. The seed from the *Datura* graft germinated rapidly and produced strong even seedlings whereas the seed from the potato graft germinated very slowly and produced an uneven lot of seedlings. It is claimed that the differences in the two groups of seedlings were of the same order as the differences observed between the two groups in their vegetative progeny, and that the changes induced by grafting are therefore not mere modifications but have a genetic basis.

819. *BUKASOV, S. M. 633.491:576.16:576.312.35:575.12
(The origin of species of potatoes).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1941 : No. 1 : 157-64.

A detailed statement is made on the systematic position of different *Solanum* species and the numerous views and possibilities that must be considered in attempting to decide the origin of various potato species.

Findings regarding chromosome number and polyploidy are mentioned.
 Authors are cited but there is no bibliography.

820. WRIGHT, R. C.,
 CALDWELL, J. S.,
 WHITEMAN, T. M. and
 CULPEPPER, C. W. 633.491:581.036:581.6
The effect of previous storage temperatures on the quality of dehydrated potatoes.
 Amer. Potato J. 1945 : 22 : 311-23.

From a study of several varieties it is concluded that the quality of dehydrated potatoes is affected by the temperature of the raw tubers during storage.

821. 633.491:581.143.26.03(47)
Plant industry. 4. Potato yields increased.
 Agriculture, Moscow 1945 : No. 4 : 9-10.

Vernalization treatment of the tubers for 70 days, early hilling and repeated hilling at short intervals are recommended by E. Zykova as labour-saving means of increasing potato yields. In two years' tests of the method in the Moscow region a yield of 41 tons per hectare has been obtained. Recommended early and medium late varieties include Epron [? Hebron] and Early Rose, Lorch, Wohltmann, and for the eastern region, Smyslovskii.

822. VESELOVSKIĬ, I. 633.491:581.162
(Growing potatoes from seeds).
 Socialističeskoe Seljskoe Hozjaistvo (Socialistic Agriculture) Moscow 1944 :
 No. 7 : p. 58.

An experiment was made in 1942 at Barnaul (Siberia) with the following nine varieties: (1) Katahdin, (2) Ella, (3) Goldwehrung, (4) Smyslovskii, (5) Kalitinec, (6) Komsomolec, (7) Rosafolia, (8) Alma and (9) Voran. From 15 gm. of seeds 21,000 seedlings were produced; the latter when planted out on an area of 0.9 ha. yielded 6.5 tons of tubers. The greatest yields were obtained from Katahdin, Alma and Voran, several individual plants producing as much as 2 kg. each.

H. F.

823. KHAN, SHAME-UL-ISLAM 633.491:581.162.51:576.356
Pollen sterility in different varieties of "*Solanum tuberosum*".
 Acta Brevia Sinensia 1944 : No. 8 : p. 17. (Mimeographed).

Pollen sterility was studied in the varieties Chippewa, Tingfan and the local Meritan. The percentage of viable pollen differed among the three varieties, being 11.5% in Chippewa and only 5.2% in Meritan. But various chromosomal irregularities are reported to be more common in Meritan than Chippewa. Inherent physiological properties and fluctuations in environmental conditions are stressed as important in the determination of pollen sterility. Future experiments will have as their object the increased production of viable pollen grains.

824. TAN, C. C. and
 SZE, L. C. 633.491:581.162.51:576.356
On the pollen sterility of "*Solanum tuberosum*".
 Acta Brevia Sinensia 1944 : No. 8 : p. 16. (Mimeographed).

In the study of microsporogenesis in the Tingfan variety, a number of chromosome anomalies were observed such as doubling, lagging and the formation of fragments. The percentage of abnormal pollen mother cells appeared to vary with the date of fixation, suggesting that these

abnormalities may result from changes in environmental conditions. Experiments are being carried out to determine the effect of various environmental factors upon the abnormalities in microsporogenesis.

825. LEHNOVIČ, V. S. 633.491:582(85)
(New forms of the potato of the Andes from Central Peru).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940: No. 5: 186-87.

Bukasov's collection of South American potatoes has been augmented by some new forms of *Solanum andigenum* Juz. at Buk. including the three here described: vars. *Vallejosi*, *acutifoliolatum* and *ancashicum*.

826. MOŠČENKO, S. I. 633.491-2.111-1.521.6:575(47)
(Potato growing in the central Pamirs).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1941: No. 1: 133-137.

Several old varieties and recently developed hybrids were planted in June, 1939. Most of the tubers had been vernalized. Varieties which in other regions are noted for their cold resistance failed to withstand the cold when cultivated in the Pamirs; certain of the new hybrids, however, grew well. It was observed that once the plants had undergone a natural hardening process, low temperature at a later growth stage caused no damage. It is considered that hybridization combined with acclimatization will succeed in producing potatoes suitable for cultivation at high altitudes.

827. LARSON, R. H. and ALBERT, A. R. 633.491-2.19-1.521.6(77.5)
Physiological internal necrosis of potato tubers in Wisconsin.
 J. Agric. Res. 1945: 71: 487-505.

Varietal tests of reaction to physiological internal necrosis are reported. Triumph and Houma exhibited little or no necrotic discoloration. Pontiac and Red Warba appear to be more resistant than Sebago, Earlane, Mesaba and Sequoia. Rural New Yorker, Russet Rural and Katahdin were among the most susceptible varieties.

828. 633.491-2.412.5-1.521.6(48.5)
 Kräftimmuna potatissorter. **(Wart immune varieties of potatoes).**
 Flygb. Växtskyddsanst. Stockh. 1942: No. 62: Pp. 4.

Descriptions are given of the more important wart immune varieties grown in Sweden and also of a few promising resistant varieties not yet being grown for sale. The latter include Konsuragis (for table and industrial purposes) and Sandnudel, a recent German production for industrial use. A useful list of some misleading synonyms is given.

829. KÖHLER, E. 633.491-2.8:575.242:631.521.6
 Die Ueberempfindlichkeitsreaktion bei *Solanum nodiflorum* Jacq. gegenüber Stämmen des Tabakmosaik- und des Kartoffel-X-Virus. **(The hypersensitivity reaction of *S. nodiflorum* Jacq. to strains of tobacco mosaic and potato X viruses).**
 Z. PflKrankh. 1942: 52: 450-54.

Closely similar necrotic symptoms are shown to develop on the leaves of *S. nodiflorum* after sap inoculation with certain mutant strains of the unrelated viruses tobacco mosaic and potato X, whereas other strains of the same viruses produce dissimilar and milder effects. Evidence is assembled to support the view that such severe necrotic reactions are in general due to a diffusible toxin, identical in these two cases, and it is suggested that strains of different viruses may acquire similar radicles which stimulate this toxin production. W. R. S. W.

830. LARSON, R. H. 633.491-2.8-1.521.6(73)
Resistance in potato varieties to yellow dwarf.
 J. Agric. Res. 1945: 71: 441-51.

In field trials in Wisconsin, the varieties Warba, Sebago and Russet Burbank, have shown considerable resistance to the yellow dwarf virus, transmitted by the clover hopper. No varietal differences in resistance to the leafhopper were observed.

831. KÖHLER, E. and
PAUKŠENS, J. 633.491-2.8-1.521.6:578.08
Solanum demissum Lindl. als Testpflanze verschiedener Mosaikviren. (*S. demissum* Lindl. as a test plant for various mosaic viruses).
Züchter 1944 : 16 : 8-11.

A description is given of the symptoms developed by *S. demissum* after sap inoculation with a number of potato (A, X, Y and aucuba mosaic) and tobacco (mosaic and ringspot) viruses. The necrotic local lesions tending to spread along the veins and caused by potato virus A are stated to provide (in the absence of tobacco mosaic) a reliable diagnostic test for this virus. W. R. S. W

832. ELIASSON, S. 633.491.00.14(48.5)
Den lokala sortförsöksverksamheten. IV. Sammanställningar av resultaten av sortförsöken med potatis under åren 1931 (1915)—1941. [The work of of local variety trials. IV. Comparisons of the results of the variety trials with potatoes during 1931 (1915)—1941].
Medd. Lantbrukshögskolan Jordbruksförsöksanstalten 1944 : No. 10 : Pp. 258.

About 100 varieties, mostly from Germany, England, U.S.A. and Holland, but also a small proportion from Sweden, were included in these trials held in various parts of Sweden. The test of the report contains tables showing the name of the breeder or grower, the origin of the variety where known, the appearance and other characteristics of the tubers. A chart is appended showing the origin and breeder, and mutual relationships of numerous varieties with a citation of the literature on which this chart is based.

Wart disease resistance only is included in the general survey, though the results of local trials provide some fuller information on rot and scab. Sources of information on other diseases are, however, cited.

833. KANGAS, J. T. 633.491.00.14(75.2)
Marygold : two-crop potato.
Sth. Seedsman 1945 : 8 : No. 12 : 13, 32.

In trials carried out in Maryland, Marygold, the new United States Department of Agriculture variety, has outyielded Irish Cobbler in the early crop and Dakota Red in the late crop. The variety is distinguished by its creamy yellow flesh, smooth skin and shallow purple eyes.

834. WRIGHT, R. E. 633.492:575.42
Three steps to improve sweet potatoes.
Fm & Ranch 1944 : 63 : No. 3 : p. 17.

Brief instructions are given on the selection criteria to be used in improving the sweet potato variety Porto Rico.

835. HOLLAR, V. E. and
HABER, E. S. 633.492-2.8-1.521.6(73)
Factors related to stem-end shrink of the sweet potato.
Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 359-69.

Investigations on the possible factors affecting the stem-end shrink which occurs in sweet potatoes during storage include a test of the susceptibility of the Porto Rico, Big-Stem Jersey or Prolific, and Yellow Jersey varieties. Big-Stem Jersey showed more susceptibility than the other two varieties.

FIBRES 633.5

836. WEBBER, H. H. 633.51:575(73)
A tropical winter plant breeding station enabling two field generations a year.
J. Amer. Soc. Agron. 1945 : 37 : 859-61.

A cotton breeding station has been established under tropical conditions in southern Mexico with the purpose of obtaining a winter crop of American Upland cottons in addition to the usual summer crop in Texas, thus shortening the period necessary in selecting for quality.

837. TER-AVANESJAN, D. V. 633.51:575.12:575.148
(The effectiveness of intravarietal crosses in cotton).
Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
1941 : No. 1 : 35-40.

The accepted system of seed production for cotton in the Soviet Union is described and discussed.

It is pointed out that atypical plants arise even at stations where seed production is confined to a single variety. This the author ascribes to the reduction of genetic plasticity by excessive single plant selection.

Comparisons were made between the yields from progeny obtained by open pollination, artificial pollination and intravarietal crossing with a pollen mixture; it was found that the plants from intravarietal crossing were more vigorous and uniform in development.

Different varieties responded differently to intravarietal crossing. An experiment was made in which 10 minutes after the application of the pollen mixture, pollen from another, red leaved variety was placed on the stigma. In this way the selectivity was measured by the number of hybrid seedlings in the progeny. The selectivity was found to correspond closely to the degree of response to intravarietal crossing.

838. 633.51:575.127.2:581.165.71:576.16

SKOVSTED, A.

635.648:575.127.2:581.165.71:582

Some hybridization experiments in the tribe *Hibisceae*.

C.R. Lab. Carlsberg 1944 : 24 : Sér. Physiol.: 1-30.

Hybridization and grafting experiments have been carried out involving 26 species of *Hibiscus*, 18 species of *Gossypium*, and one species of each of the following genera, *Kosteletzkyia*, *Cienfuegosia*, *Thespesia* and *Gossypioidea*. No intergeneric hybrids were obtained. The classification of the genus *Hibiscus* is discussed in the light of the various relationships indicated by the data of the hybridization and grafting experiments.

The hybrids obtained by crossing *Gossypium Klotzchianum* with *G. Davidsonii*, *G. Stocksii*, *G. anomalum* and the F_1 hybrid *G. barbadense* x *G. arboreum*, are described and the results of all the hybridization work with the 18 species of *Gossypium* are summarized diagrammatically. The interrelationship of the different Old and New World species is discussed, and a diagram is presented illustrating the probable course of their evolution.

839. TER-AVANESJAN, D. V.

633.51:581.162.32

(The biology of flowering of cotton).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)

1940 : No. 5 : 181-83.

Cross-pollination of cotton is mainly entomophilous.

A study of insect visits and the resulting cross-pollination was made in 1937 on 410 flowers, 286 of which formed bolls. Of the latter 163 belonged to a green-leaved variety 0246 and the rest to the red-leaved Wine Sap. In 1938 seed of both varieties was sown and 3836 plants of 0246 were obtained of which 55 were hybrids, i.e. 0.69%.

The 123 bolls of Wine Sap produced 2985 plants comprising 32 green leaved hybrids, i.e. 1.01%. A repetition of the observations was made in 1938 to collect data on the numbers of insect visitors and the time of the visit. The percentage of cross-pollination on this occasion was 0.90 for 0246 and 2.32 for Wine Sap, while the percentages for the hours from 10-11, 11-12 and 12-1 were respectively 0.48, 0.33 and 0.09 from 0246 and 1.28, 0.83 and 0.12 for Wine Sap. Wine Sap alone showed any crossing (0.09%) at 9-10 a.m. and neither variety produced any hybrid plants as a result of visits from 1-3 p.m.

Jakontov's findings on the same subject are criticized.

The time of flowering and the fertilization period of the same flower may vary in accordance with the geographical and climatic conditions.

840. ARNDT, C. H.

633.51-1.521.5

Viability and infection of light and heavy cotton seeds.

Phytopathology 1945 : 35 : 747-53.

Seed lots of Upland cotton varieties were acid-delinted and separated into light and heavy seeds in the process of washing with water.

Variety was found to be a more important factor than seed viability, fungal infection or crop year, in determining the relative proportions of light and heavy seeds. Improvement of seed quality by the separation of light and heavy seed does not therefore appear to be of practical importance.

841. SMITH, H. P.

633.51-2.183-1.521.6:575.42(75)

Storm-proof (Macha) cotton.

Sth. Agric. 1944 : 74 : No. 4 : p. 24.

Macha cotton is a local Texan selection resistant to wind. It is however rather difficult to

separate the cotton from the bur during extraction, so varieties intermediate in wind-resisting properties and extractability are being developed by hybridization with typical forms.

842. CHEO, M. T. 633.51-2.7-1.521.6
 [Experiments on the resistance of Chicken Foot (*Gossypium arboreum* var. *neglectum* and *G. arboreum* var. *roseum*) to the cotton leaf-roller (*Sylepta derogata*)].
 New Agric. J. Fukien 1943 : 3 : 62-69.

The Chicken Foot cotton has been found to be definitely resistant to the cotton leaf-roller, as its narrow, deeply cut leaves are not suitable for the leaf-rolling habit of the larvae. L. P. B.

843. LEDING, A. R. and
 LYTTON, L. R. 633.51.00.14(78.9)
 Cotton variety tests in the Rio Grande Valley of New Mexico 1940-1943.
 Bull. N. Mex. Agric. Exp. Sta. 1944 : No. 319 : Pp. 16; also Supplement to
 Bull. 319 : Pp. 2.

As a result of tests carried out during 1940-1943 of Acala strains and long-stapled upland cottons such as Coker Wilds, Deltapine and Stoneville, the generally grown Acala 1517 was found to be most suitable for cultivation in the Rio Grande Valley. Data on the 1944 test are reported in the supplement. Among the new strains tested were the wilt resistant strains Acala W 29 and Acala W 29-4, and two strains of Acala 1517, 39-75 and 11, selected for improved fibre characters and yield, which were developed at the U.S. Cotton Field Station, Mexico. The wilt resistant Acala strains, W. 29, W 29-1 and W 29-4, all gave higher yields than Acala 1517, although the lint percentage of two were lower; these strains also exhibit superiority in strength and were slightly longer. Acala 39-75 and 11 yielded approximately the same as Acala 1517; Acala 39-75 was, however, slightly longer and stronger than the parent strain.

844. MEDVEDEV, P. F. 633.512-1.524(47)
 633.512:575(47)
 (Results of the introduction of American forms of *Apocynum*.
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : No. 3 : 107-16.

Out of the hundreds of species of *Apocynum* only six or seven are found in the Asiatic continent. The introduction of species from North America where so many different species and forms exist is imperative.

Brief comments on different species in America and in Central Asia and their uses are followed by an account of comparisons made of introduced specimens of *A. cannabinum*, *A. hypericifolium*, *A. androsaemifolium*, *A. pubescens*, *A. sibiricum* and other species.

Owing to the tendency to spread by subterranean rhizomes special arrangements of the experimental plots had to be adopted.

A short botanical description of the main species of the American forms of *Apocynum* is followed by observations collected on the biology of growth, height and development of various species and records of the soil and other requirements of the crop.

Mention is also made of drought resistance in relation to growth. The fibre qualities of certain species are described.

The majority of the American and the native Russian species are cross-pollinated according to the author. Under favourable conditions the North American species, *A. hypericifolium* and also *A. cannabinum* may form 130-150 pairs of leaflets on a single stem, whereas the Central Asiatic type at best produces only 7-10 pairs. The North American type is also remarkable for its high rate of reproduction by seed.

A breeding programme accompanied by the introduction of foreign species should, it is suggested, include individual clonal selection, family selection and hybridization. The species recommended for crossing are *A. cannabinum* and *A. hypericifolium* on account of their earliness in regard to vegetative and sexual reproduction, good drought resistance, adaptability to field conditions and, in some forms, the relatively small degree of branching of the stem. Other points upon which selection should be based are early maturity of stem, fineness of stem, a highly placed inflorescence of the first order, increased yield of fibre from the stems and rubber and resin from the leaves. Breeding should be carried out under good conditions of cultivation to hasten the production of reliable varieties for growing as a field crop.

The possible uses of the plant are mentioned. The leaves of *A. cannabinum*, *A. hypericifolium* and *A. venetum* are reported to contain 4-4.7%, 4.5-6% and 4-5% of rubber respectively. The resin content of the leaves may reach 7-9% of the dry weight. The Central Asiatic representatives of *Apocynum* have only about half as many leaves as the American and the amount of rubber in the leaves, as recorded under northern conditions at Pushkin, was 0.3-0.4%.

845. OPITZ, K. 633.52:575(43)
Ökologie und Züchtung der Faserpflanzen Hanf und Lein. (**Ecology and breeding of the fibre plants hemp and flax**).
Forschungsdienst 1942 : Shft 16 : p. 390.
[From Züchter 1943 : 15 : 165-66].

In extensive experiments made in Germany and German-occupied Poland adaptation and vegetative period were studied. The hybrid, Sorau strain 35 (Roland), gave good yields and was only slightly inferior in fibre quality to fibre flax. Drought resistance of linseed and fibre flax was studied.

846. PARDO PASCUAL, M. 633.52:581.143:581.6:519.24
Comentarios a un ensayo de variedades de lino para fibra. (**Comments on a trial of flax varieties**).
Bol. Inst. Invest. Agron. Madr. 1945 : No. 12 : 349-69.

The germinability, growth rate, seed production and fibre production have been investigated for the fibre flax varieties Eckendorfer, Daros I, Daros II, Zamora and Zaragoza. Analyses of variance were also made in uniformity trials of these varieties.

847. CASTRO, D. R. DE. 633.52:582(46.9)
Posição actual de sistemática dos linhos portugueses. (**Present position of the systematics of Portuguese flaxes**).
Bol. Soc. Broteriana 1944 : 19 : Sér. 2a : 223-32.

The flax grown in Portugal even to-day is very mixed, and an historical account is given of the various works that have been devoted to its classification.

The author has made collections of flaxes from all over the country and brief descriptions are given of the main types, Mourisco, Galego, Coimbrão and Serrano or Serradiço. Some of the synonyms under which they are found are also indicated.

848. KANISKIN, M. F. 633.522:575.42(47)
(**Hemp investigations at the Penza Experimental Station**).
Bjulletenij Zernovogo Hozjaistva Jugo-Vostoka S.S.S.R. (Bull. Inst. Grain Husb. S.E. U.S.S.R.) Saratov 1945 : No. 3 : 21-28.

Before the Revolution, only variations of a local hemp, belonging to the Central Russian type, were grown in the Penza government. Hemps of this type could mature seed in fair amount, but only produced little fibre and of a poor-quality.

After the Revolution, varieties of hemp which would yield both fibre and seed began to be bred. Three types of hemp were drawn upon: (1) the southern type, which included Italian, Japanese, and Caucasian hemps; (2) the Central Russian type, already referred to; and (3) the Ukrainian type, which was intermediate in its characters between the other two types. The first variety to be produced was an improvement of the Staro-Oskoljsk hemps or Central Russian type. In the present article it is compared with this type and a Penza local variety, and is shown to be better than either of them in yield and quality of the fibre, but not equal to the local variety in yield of seed. The improved Staro-Oskoljsk variety (S.O.U.) was obtained by mass selection. The seeds of the selected plants were sown in isolation. Selection was repeated.

Another variety is also described. It was obtained by repeated mass selection from an Italian hemp, the characters desired being tallness and a good yield of seed. Compared with the local variety, it yielded more fibre and of better quality; but again, there was less seed. Another disadvantage was its slow maturing; this can be partially mitigated by means of good management and early sowing.

I. Z.

849. CRANE, J. C. and ALONSO, R. E. 633.526:581.6(72.91)
Fiber content in relation to length and age of *Sansevieria* Thunb. leaves.
 J. Amer. Soc. Agron. 1945 : 37 : 953-61.

Leaves of the three species, *Sansevieria guineensis*, *S. zeylanica* and *S. cylindrica*, have been analysed for fibre content at the Cuban Agricultural Experiment Station. The relationship of fibre content with leaf length and age has been determined in *S. guineensis*.

850. REYES, C. A. 633.526.1(72.86)
 Cultivo, industrialización y posibilidades futuras del abacá en Costa Rica.
 (Cultivation, industrial processing and future possibilities of abacá in Costa Rica).
 Dep. Nac. Agric. San José, C.R. 1945 : Pp. 36.

This bulletin includes descriptions of the Costa Rican varieties Bungulanan, Libutan, Maguin-danao, Sinaba, Putean, Tonggongon and Bastardo.

851. AFIFY, A. 633.526.2:576.354.4
Chromosome pairing and chiasma formation in *Aloe*.
 Bull. Fac. Sci., Fouad I Univ. Cairo 1945 : No. 25 : 97-110.

A description is given of meiosis in *Aloe Schimperi* Tod. There are 14 diploid chromosomes which terminalize markedly before metaphase.

SUGAR PLANTS 633.6

852. GAVIRIA, J. E. 633.61:575(86)
 Creación de nuevas variedades de caña de azúcar en Colombia. (Production of new varieties of sugar cane in Colombia).
 Rev. Fac. Nac. Agron., Colombia 1940 : 3 : 851-93.

After pointing out the necessity for producing indigenous sugar cane varieties adapted to the climatic and other conditions of the country, the author goes on to relate how work along these lines was initiated.

The more outstanding features of the work accomplished by the Sugar Cane Section of the Estación Agrícola Experimental de Palmira (Valle) during the years 1938-40 are outlined. The main research problems have been (a) the production of hybrids between the progeny from the Russian frost resistant variety Amu-darya 59 and improved Colombian indigenous strains in an effort to secure frost resistant varieties capable of growing at altitudes of up to 2000 metres above sea level; and (b) hybridization and selection with improved indigenous canes. Promising lines from this latter work are E.P.C. 16-88, 18-11, and especially 17-72, all obtained from the cross P.O.J. 27-25 x M.C. 129.

J. G. H.

853. PEDROSA, R. 633.61:57512.(72.91)
 A Vd. debe interesarle que.... (It should interest you that).
 Bol. Ofic. Asoc. Tec. Azucar., Cuba 1945 : 4 : 172-74.

A useful list is presented of the genetic origins of the sugar cane varieties commonly grown in Cuba.

854. CROSS, W. E. 633.61-2.451.2-1.5216(82)
 Datos adicionales sobre el "carbón" en las distintas variedades de caña de azúcar. (Additional data on smut in the different varieties of sugar cane).
 Bol. Estac. Exp. Agric. Tucumán 1943 : No. 43 : Pp. 13.

Further information is presented on the smut resistance of Tucumán sugar canes. Some correlation appears to exist between resistance and ascension number, but it has not been possible to establish any relation between the resistance of varieties and their genealogy.

855. YEN, C. H. 633.61-2.7-1.521.6(51)
 (Studies on the life history of the sugar-cane borer, *Argyris* sp., with special reference to the damage caused by the borer to the cane).
 New Agric. J. Fukien 1943 : 3 : 97-111.

The different stages of the borer, *Argyris* sp., and the manner and extent of the damage done by the larva to sugar cane are described.

L. P. B.

856. ANDERSON, W. S.

633.62:581.6(76.2)

Hodo, new sorghum for sirup, described.

Miss. Fm Res. 1944 : 7 : No. 3 : p. 1.

The sorghum variety Hodo is figured and described. It has been grown for an unknown period by the farmers of northern Mississippi and is being recommended for the whole state on account of its high yields of good quality sirup.

857. TROJE, E.

633.63:581.032(43)

Futter- und Zuckererträge bei verschiedenen Zuckerrübensorten unter verschiedenen Wachstumsbedingungen. (**Fodder and sugar yields of different sugar beet varieties under different growing conditions**).

Zuckerrübenbau 1944 : 26 : 31-32.

An account is given of the dry matter and sugar yields of the varieties Z, N1, N2, E1 and E2 during the years 1939-42. The results are discussed in relation to the moisture conditions obtaining during each year.

858. OWEN, F. V.

633.63:581.162.51:575.142:575.11

Cytoplasmically inherited male-sterility in sugar beets.

J. Agric. Res. 1945 : 71 : 423-40.

The male sterile forms found in varieties and strains directly or indirectly derived from the curly top resistant variety U.S. 1 appear to be conditioned by two types of cytoplasm and modifying Mendelian factors. The type of cytoplasm carried by normal hermaphrodites is designated *N*, and that belonging to completely and partially male sterile plants *S*; in plants with *S* cytoplasm the degree of male sterility is determined in most cases by two genes only, designated *X* and *Z*. Analysis of the hybrid progeny produced from crosses involving completely and partially male sterile and hermaphrodite sugar beets suggests the following genotypes: (1) complete male sterility, *Sxxxz*; (2) partial male sterility, usually without viable pollen, *SXxzz* or *SxxZz*; and (3) partial male sterility and sometimes indistinguishable from the normal hermaphrodite condition, *SXxZx*. The completely male sterile form is characterized by white, empty anthers. Relative stability was shown by this cytoplasmically inherited male sterility, only two single male sterile plants being observed which bore sectors of inflorescence with fairly normal anthers.

Inheritance of similar male sterility in the Munerati annual beet and the curly top resistant strain 12c appeared on the other hand to be nuclear.

The possible use of the cytoplasmically inherited, completely male sterile forms for research and commercial purposes is discussed. By crossing male sterile mother plants of the genotype *Sxxxz* with selected *Nxxxz* hermaphrodite plants, completely male sterile progeny can readily be obtained. It is, however, stated that further research, including work on inbred lines, has to be carried out before the use of the male sterile form in the commercial production of F_1 hybrid seed can be considered.

859. KRASOČKIN, V. T.

633.63-1.531.12:581.143.26(47)

(On the influence of the region where the seeds are grown on the succeeding generation of beets).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
1941 : No. 1 : 61-70.

It is concluded that, although sugar beet originating in southern latitudes acquires a tendency to bolt, variations suitable for cultivation in northern regions can be produced in somewhat more southerly latitudes which do not bolt when sown in the north. So long as the seed is not produced in the more southerly latitude for more than one or two generations, no harm is done. The alternative method of local seed production, though possible, involves the expense and other disadvantages of artificial propagation in glasshouses.

I. Z.

860. GERICKE, S.

633.63-1.557(43)

Wirkung verschiedener Wachstumsfaktoren auf den Ertrag der Zuckerrübe.
(**The effect of different growth factors on the yield of sugar beets**).

Zuckerrübenbau 1944 : 26 : 21-24.

In this analysis of the various environmental factors affecting sugar beet yield, brief reference is made to the importance of intervarietal differences.

861.

633.63-2.8-1.521.6:575(73)

New improvements due in resistant seed types.

U. and I. Cultiv., Utah 1945 : 5 : No. 3 : p. 28.

A brief account is given of the following curly top resistant varieties developed by the U.S. Department of Agriculture: U.S.1, U.S.12, U.S.15, U.S.22, U.S.33 and U.S.34. The three last named varieties have now been replaced by improved types. Improved U.S.22 has been sown on a large scale since 1944.

STIMULANTS 633.7

862.

633.71:576.35:582:576.16

GOODSPEED, T. H.

633.71:576.354.4:575.127.2:016

Cytotaxonomy of *Nicotiana*.

Bot. Rev. 1945 : 11 : 533-92.

A critical review is given of studies on the morphology, distribution and cytology of the genus *Nicotiana* and on interspecific hybridization within the genus; the phylogenetic relationships indicated by the data obtained in these investigations are discussed in relation to the classification of *Nicotiana*. The bibliography contains 157 references and the paper includes a useful list of the F_1 interspecific hybrids which have been cytologically investigated, with references in each case to the text and bibliography.

863.

633.71:581.032:575.113.4

HEGGESTAD, H. E.

633.71-2.3-1.521.6:581.032

Varietal variation and inheritance studies on natural water-soaking in tobacco.

Phytopathology 1945 : 35 : 754-70.

The results of some of the investigations reported in this paper have been previously summarized by the author (Cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1106). A summary of the complete report is given below:—

A considerable number of foreign, domestic and local tobacco varieties have been studied for their reaction to natural water-soaking in moist-chambers and out-door seed-beds. The amount of water-soaking is expressed as scores based on the amount of leaf area water-soaked and on the percentage of plants water-soaked. Varietal differences to water-soaking were observed, the variety American being the most susceptible and Daruma the most resistant.

The inheritance of response to natural water-soaking was studied in crosses involving seven varieties. The F_1 progeny of most crosses were intermediate between the parents in water-soaking scores. Certain hybrids, however, exhibited partial dominance of resistance. Data from F_2 and F_3 families indicate that many factors determine reaction to water-soaking. Resistance to wild-fire (*Phytophthora Tabaci*) was closely correlated with resistance to water-soaking.

Differences in response to water-soaking were also found between 14 *Nicotiana* species, tomato and oats varieties, and between maize inbreds. *N. nudicaulis* Wats., *N. repanda* Willd. and *N. rustica* L. were the most resistant *Nicotiana* species. The oats varieties were inoculated with halo blight (*Phytophthora coronafasciens*). Correlation was shown between response to water-soaking and the incidence of disease.

864.

KERN, E. M. and

ALPER, C.

633.71:581.46:575.127.2-18

Multi-dimensional graphical representation for analysing variation in quantitative characters.

Ann. Mo. Bot. Gdn 1945 : 32 : 279-81.

Variation in the quantitative characters of the flower was studied in a cross between *Nicotiana Langsdorffii* and *N. alata* by a method of multi-dimensional figures. The flowers of the F_1 and F_2 were found to be intermediate in size between those of the parent species.

865.

JOHNSON, J.,

OGDEN, W. B. and

ATTOE, O. J.

633.71:581.6(77.5)

Experiments on the leaf-burn of tobacco.

Circ. Wis. Agric. Exp. Sta. 1944 : Res. Bull. No. 153 : Pp. 75.

The bulletin includes a report of investigations on varietal variation in burning quality of the tobacco leaf. Varietal differences have not been found to be sufficiently large to provide scope for improvement by breeding.

866. ALCARAZ MIRA, E. and SEQUEIROS BORES, J. M. 633.71-2.112-1.521.6(46)
 Poder de absorción de las principales variedades de tabaco cultivadas en España. (**The absorption capacity of the principal varieties of tobacco cultivated in Spain**).

Bol. Inst. Invest. Agron. Madr. 1945 : No. 12 : 285-328.

An account is given of the water absorbing capacities of the following varieties: Yalomita, Bohemia, Valencia Alto, Mammoth Gold, Maryland, White Burley, Habana 142, Hybrid 196 and Hybrid 60.

867. KOSTOFF, D. 633.71-2.8-1.521.6:575.127.2
 (**Resistance to tobacco mosaic virus. I. Resistant tobacco varieties mosaic virus experimentally produced**).

Centralena Zemedelski Izledovatelski i Kontrolena Instituta, Sofija. (Cent. Agric. Res. Control Inst.) Sofia 1944 : 3-12, 35-45.

KOSTOFF, D. and

GEORGIEVA, R.

(**Resistance to tobacco mosaic virus II. Inheritance of necrotic reaction and plant breeding value of the form *Nicotiana tabacum* var. *virii***).

Ibid. 1944 : 13-34, 46-54.

In the first paper the work of breeding *N. Tabacum* forms which possess the local necrotic reaction to mosaic virus of *N. glutinosa* and *N. rustica* var. RL and also produce fully fertile hybrids when crossed with other *N. Tabacum* varieties is described. Two kinds of hybrids were studied, viz., (*N. rustica* var. RL x *N. Tabacum* var. Basma) x *N. digluta* and *N. Tabacum* x *N. digluta*, *N. digluta* being the amphidiploid between *N. Tabacum* and *N. glutinosa*.

A plant obtained from the first cross, possessing two *N. Tabacum* genomes and one genome from each of *N. rustica* and *N. glutinosa*, and giving the local necrotic reaction, was back-crossed to *N. Tabacum*. Nine plants from the back-cross, closely resembling *N. Tabacum*, exhibited the local necrotic reaction. A second back-cross to *N. Tabacum* was made with the plant showing the highest fertility. Three fertile families homozygous for local necrosis were secured by selfing for two generations selected second back-cross plants. By selfing plants from the second back-cross of *N. Tabacum* x *N. digluta*, three families were also produced which were homozygous for the desired local necrotic reaction. In both hybrids, these families had the normal *N. Tabacum* chromosome number.

The family B₂V₃-9 from the cross (*N. rustica* x *N. Tabacum*) x *N. digluta*, homozygous for the local necrotic reaction and exhibiting most morphological uniformity, has been designated *N. Tabacum* var. *Virii*.

The second paper reports the results of crossing *N. Tabacum* var. *Virii* with No. 36 Nevrocop Basma, American white tobacco from Guatemala, Virginia Brightleaf and Florida Black Shank Res. 301. Triple hybrids between small-leaved F₁ hybrids with *N. Tabacum* var. *Virii* as one parent and a third large-leaved or small-leaved variety have also been studied.

The data indicate that *N. Tabacum* var. *Virii* possesses the genes not only for the local necrotic reaction of *N. glutinosa* but also for the reaction of *N. rustica* var. RL which at normal temperature is the local necrotic action and at higher temperature the "flowing" necrosis.

Several homozygous F₂ and F₄ families for the local necrotic reaction were obtained from the cross *N. Tabacum* var. *Virii* x No. 36 Nevrocop Basma, and one homozygous family from the cross *N. Tabacum* var. *Virii* with the American white tobacco. F₁ and F₂ data are given for the remainder of the crosses.

A discussion is included of the possible mode of inheritance of the necrotic reactions.

868. ANDRÉS, J. M. and SAURA, F. 633.77:576.312.35
 633.77:576.312.332

Los cromosomas de la yerba mate y otras especies del género "*Ilex*". (**The chromosomes of maté and other species of the genus "*Ilex*"**).

Fac. Agron. Vet. Inst. Genet. Univ. B. Aires 1945 : 2 : 161-68.

The chromosome configurations of *I. paraguariensis* St Hil., *I. theezans* Mart. and *I. dumosa* Reiss are described. In all cases, the haploid chromosome number is $n = 20$. There is some evidence of a heteromorphic chromosome pair concerned in sex determination.

869. BEARD, F. H. 633.79:575(42)

Hop growing in Great Britain with special reference to research work.

Wallerstein Laboratories Communications 1945 : 8 : 83-98.

A brief history is given of hop growing in the British Isles, and various aspects of research are reviewed. A useful bibliography of 32 references is included. The older varieties, viz., Fuggle, Goldings and the so-called "Goldings" varieties, are described, and an account is given of breeding work at Wye and East Malling, which includes selection in these older varieties, and the breeding of new varieties chiefly by crossing European or American varieties with male English hops. The performance and characteristics of the nine new varieties released for commercial planting during the period 1934-43 are summarized in the article. A discussion is given of the problems of varietal evaluation.

870. KEYWORTH, W. G. 633.79-2-1.521.6(42)

Hop diseases in Great Britain.

Wallerstein Laboratories Communications 1945 : 8 : 99-109.

Reference is made to varietal reaction to several diseases.

871. MAGIE, R. O. 633.79-2.411.4-1.521.6:575(74.7)

Disease resistance in New York hops urgently needed.

Fm Res. 1944 : 10 : No. 3 : 5, 6.

Information is presented on the degree of resistance to downy mildew exhibited by the hop varieties grown in New York. At the moment, Brewer's Gold is the most resistant variety but it is too leafy to be entirely satisfactory. Breeding work is in progress to obtain high-yielding, disease-resistant forms devoid of "foreign" flavour.

CONDIMENTS 633.84

872. COCHRAN, H. L. 633.842:575

The Truhart Perfection pimiento.

Bull. Ga Exp. Sta. 1943 : No. 224 : Pp. 18.

A description is given of the new pimiento variety, Truhart Perfection, an inbred selection of Perfection. Truhart Perfection, like the parent variety, is primarily a canning type, but is also suitable for garden planting. The fruit is heart-shaped, and free from a depression at the stalk end. The new variety shows improvement over Perfection in total yield, yield of No. 1 sized fruits, colour, thickness of flesh, and uniformity of fruit size and shape. In addition, the plant habit is such that good protection of the fruit from the sun is provided.

OIL PLANTS 633.85

873. ANDERSSON, G. 633.85:575(48)

Oljeväxterna. Odlingens omfattning och odlingsmaterial i Sverige och grannländerna. (Oil crops. Extent of cultivation and types grown in Sweden and the neighbouring countries).

Årsb. Jordbruksforskning, Stockholm 1945 : 94-105.

The increasing acreages under oil crops, including soya bean, in Sweden are considered.

In discussing the breeding work in operation since 1938, the role of the following varieties in rape improvement is outlined: Svalöfs Primraps, Svalöfs Senraps [Late Rape], and the German variety Lembkes winter rape.

An improved Swedish winter turnip rape, called Rapido, obtained by individual selection from a Polish variety Vilmensis was put on the market in autumn 1944. Though not equal to Senraps in yield, it is more winter hardy and being earlier is also resistant to the rape beetle. Attempts are now being made to breed varieties combining these desirable features of Rapido with higher yield.

The first improved spring rape, Svalöfs Regina was produced during 1938-42 by mass selection from a Danish commercial strain from Lyngby which it surpasses in productivity and uniformity of development. Breeding is now being directed to obtain earlier varieties more uniform in flowering and ripening, and also more rapid growing at the seedling stage, so that damage by insect pests may be reduced.

No improved white mustard varieties have been put on the market yet; breeding is proceeding for higher yield and oil content and earlier maturity.

Poppy breeding aims at producing a variety that will combine the high yield of Mahndorfer with the earliness and strength of straw of Peragis.

A new Svalöf linseed Atlas, was released in spring 1944. In 1940-43 it surpassed Svalöfs Renodlade (Svalöf Pure-bred) by 5.9% in yield and by about 3% in oil content. Atlas and Pure-bred are both blue flowered.

Sunflower is represented so far by a Russian and a Rumanian variety very similar in habit, earliness, yield and appearance of the seed, and also by a Polish variety which is later in ripening and higher yielding. In soya bean growing a brown seeded Polish variety Vilnensis and the black seeded variety Altonagaard AI are used. Sunflower and soya bean breeding is in progress. Brief notes on the oil crop situation in Denmark, Finland and Germany are also given. In Finland, among other oil crops, *Brassica juncea* (the so-called Fiskeby mustard) has been tried in recent years and has done better than in Sweden.

The varieties of autumn rape that have been tried in Germany include, in addition to Lembkes which is the best, Janetzki, Niederanbacher, Nordost Kraphauser. Spring rapes in Germany include two varieties approved in 1941, Liho and Janetzki's Weihestephaner: the former in Swedish trials in 1944 surpassed Svalöfs Regina in yield, but is rather too late. In 1941 white mustards in Germany included an approved variety Erbachshofer.

874. DOMINGO, W. E. and CROOKS, D. M. 633.853.55.00.14(73)

Investigations with the castor bean plant: I. Adaptation and variety tests.

J. Amer. Soc. Agron. 1945 : 37 : 750-62.

Tests have been conducted during the years 1941-43 at many different locations in the southern United States to obtain information with regard to the adaptability of the castor bean in this region, the value of different varieties, and the most suitable cultural methods. Mainly on the basis of yield, purity and size of raceme, Conner, Doughty 11 and Kentucky 38 are considered to be the most useful varieties. The objectives of future breeding work are described as follows: greater yield, complete resistance to shattering, and the production of varieties with larger racemes suitable for head harvesting and of small stemmed types for combine harvesting.

875. GRIEBEN, H. 633.854.54.00.14(82)

Resultado de los ensayos comparativos de rendimiento "standard" entre variedades de lino para grano, realizados en el año agrícola 1942-43. (**Result of the comparative trials for "standard" yield of linseed varieties obtained in the agricultural year 1942-43**).

"Granos" Semilla Selecta, B. Aires 1944 : 8 : Nos. 10-12 : 3-36.

Data are presented on the yield, susceptibility to *Fusarium Lini*, *Sphaerella Linorum* and *Melampsora Lini*, flowering and maturation periods, and flower colour of the following linseed varieties: Benvenuto Labrador, Benvenuto Real, Buck 3, Buck 113, Buck 114, Entre Rios, Klein 11, La Previsión 18, P.330 M.A. and Querandí M.A. The trials were replicated at 19 testing stations.

876. MENDES, P. T. 633.854.56:575.127.2

Nota preliminar sôbre a hibridação do tungue. (**Preliminary note on the hybridization of tung**).

Rev. Agric., Piracicaba 1945 : 20 : 274-76.

In 1941 a successful cross was made between *Aleurites Fordii* Hems. ♀ and *A. montana* (Lour). Wils. ♂, and in the following year 52 seeds were obtained from the fruits set. Ten plants were obtained from them the following year and are now growing vigorously. At first they showed a predominance of the characters of *A. montana*, but later they proved intermediate in most characters.

877. HWANG, SHUI-LWEN and LEE, YOU-KAI 633.854.56:581.48:581.6(51)

(**Studies of the quality of tung oil fruits of Kwangsi Province**).

Kwangsi Agric. 1941 : 2 : 343-70.

An analysis of oil content and quality of the fruit kernels was made in four local varieties of *Aleurites Fordii* Hemsl., including both cluster and single types, and *A. montana*. Calculated on a dry weight basis, the oil content of *A. Fordii* was 54.37-70.98%, that of *A. montana* 63.54%.

The quality and quantity of the oil of fruit kernels from individual trees of both species varied significantly. The refractive index of the cold expressed oil was found to be highly correlated with the iodine number, and it is suggested that for the purpose of individual selection and breeding work the refractive index of the cold expressed oil can be used for calculating the iodine number with a degree of accuracy comparable with that of the usual procedures.

878. TAVČAR, A. 633.854.78:575.247.061.633
Somatische Mutationen an Blättern und im Perikarp von Sonnenblumen
(*Helianthus annuus* L.). [**Somatic mutations in leaves and in the pericarp
of sunflowers (*H. annuus* L.)**]
Poljod. Znanstvena Smotra, Zagreb 1942 : No. 5 : p. 40.
[Züchter 1943 : 15 : p. 153].

Two chlorophyll-deficient forms found in a variety of *H. annuus* in Croatia had colourless chloroplasts in sectorial areas of the leaf blades and stems. Plastid mutation is assumed to be the cause. Two other plants were noted in which some of the seeds had a white pericarp. The normal seeds in such plants produced only normals, whereas the seeds of abnormal colour gave 37.6% and 21.8% of plants with white pericarp and normal (violet, white-striped) respectively.

879. DIMITRI, M. J. 633.854.78-2.112-1.521.6(82)
La resistencia del girasol (*Helianthus annuus* L.) a las sequías estivales. [**The
resistance of the sunflower (*H. annuus* L.) to summer droughts**].
"Granos" Semilla Selecta, B. Aires 1944 : 8 : Nos. 1-3 : 29-31.

Brief reference is made in this article to varietal differences between Argentine varieties in resistance to summer droughts.

MEDICINAL PLANTS 633.88

880. MARZELL, H. 633.88:001.4(43)
Die deutschen Namen der heimischen Heilpflanzen. (**The German names of
domestic medicinal plants**).
Dtsch. Heilpflanzen 1944 : 10 : No. 3 : 17-20.

A list is given of German medicinal plants (*Achillea Millefolium* to *Cydonia oblonga*) arranged in the alphabetical order of their Latin names. For each entry, the modern High German equivalent is given, and notes are added on the Low German variants and on the forms employed in Old and Middle German.

881. CROIZAT, L. 633.88:582(72.81)
New species of *Croton* from Guatemala.
Field Museum of Natural History, Chicago Bot. Ser., 1942:22 : No. 8 ; Publ. 516 :
445-53.

The author describes six new species of *Croton*, namely, *C. botryocarpus*, *C. jalapensis*, *C. jutia-pensis*, *C. lasiopetaloides*, *C. limnocharis* and *C. quercetorum*. The taxonomy of certain other related species is discussed. J. G. H.

882. LITTLE, R. D. 633.885.1:578.088
**Histology of barks of *Cinchona* and some related genera occurring in
Colombia.**
For. Econ. Admin., Gen. Commodities Div., Cinchona Sect. Washington, D.C.
1945 : Pp. 73.
[From Trop. Woods 1945 : No. 84 : p. 29].

"In connection with the *Cinchona* bark procurement program in Colombia, South America, histological studies were made of the barks of *Cinchona* and some related genera. Five species of the Rubiaceae, *Cinchona officinalis*, *C. pitayensis*, *C. pubescens*, *Remijia pedunculata*, and *Ladenbergia hookeriana*, have been found to contain one or more of the alkaloids quinine, cinchonidine, cinchonine, and quinidine. All barks which have been found to contain not more than traces of any of these alkaloids are collectively designated 'false barks'.

"The normal forms of the five Colombian species of *Cinchona* and the three named *Remijia* species of the *R. pedunculata* group can now be determined from microscopic characters alone; and all false barks encountered can be differentiated from the foregoing by the same method. Descriptions, study outline, and keys for use in these determinations are provided."

[Author's summary].

Le quinquina. (*Cinchona*).

633.885.1:581.6

633.885.1:581.165.71

RUBBER PLANTS 633.91

El cultivo del caucho (*Hevea brasiliensis*) en la América tropical. [The cultivation of rubber (*H. brasiliensis*) in tropical America].

Nos 147-148 : Pp. 44.

(The rubber content of North American *Apocynum* species and some factors in latex accumulation).

1940 : No. 5 : 101-08.

Of the species tested for the rubber content of the leaves, *A. hypericifolium* and *A. cannabinum* and *A. venetum* from Central Asia ranked highest. The American species were superior to the Asiatic in the amount of foliage produced, but the last named had the lowest resin content.

Experiments in different localities showed that dry atmosphere, soil, sunshine and a higher atmosphere temperature in the second half of the vegetation period are favourable to the accumulation of rubber in the plant.

Evidence for genetic variation among apomictically produced plants of several F₁ progenies of guayule (*Parthenium argentatum*) and mariola (*P. incanum*).

(Conditions of rearing and how to increase the productivity of koksaghyz).

The development of the plant has been studied and the author holds that the aims of future

work to increase the output of rubber should be: (1) the production of varieties that are perennial instead of biennial; (2) the elimination of the resting period by suitable methods of cultivation by selecting and breeding forms that can withstand unfavourable conditions without such a period; (3) the acceleration of the slow growth in young plants; (4) the raising of cultivated varieties with high rubber content and root yield; (5) the best possible seed material with high germination energy and weight should be used, to ensure uniform germination. The importance of proper methods of cultivation (spacing in particular) is stressed and weed control to prevent crossing with the ordinary dandelion is stressed.

FRUITS AND NUTS 634

888.

Horticulture in Byelorussia.

Agriculture, Moscow 1945 : No. 3 : 3-4.

A brief account is given of fruit growing in Byelorussia. Before the German invasion about 3000 different varieties were used in breeding fruit trees and small fruits at the Byelorussian Horticultural Station. The nurseries of the Station contained 40,000 hybrid seedlings raised by Michurin's method.

634:575(47)

889.

ALDERMAN, W. H.

634:575(77.6)

Pioneer goals passed in fruit breeding.

Minn. Fm & Home Sci. 1944 : 1 : No. 3 : 2-3.

A short account is given of the fruit breeding achievements of the Minnesota Fruit Breeding Station.

890.

TETEREV, F. K.

634:575.127.5:007

635:575.127.5:007

(**The great reformer of nature—Ivan Vladimirovič Michurin.**)

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record) 1940 : No. 3 : 3-14.

KRJUKOV, F. A.

(**A great citizen of the U.S.S.R.—Ivan Vladimirovič Michurin**)

Ibid. 1940 : No. 3 : 15-16.

The work accomplished by Michurin, who created over 350 new varieties of berries, vegetables, ornamental and other plants, forms the subject of these articles.

891.

RODRIGUES, A.

634.1/2:578.08

Filometria e carpometria nas Pomóideas e Prunóideas. Generalização à pomologia sistemática de um método de determinação da forma. (**Phyllometry and carpometry in the Pomoideae and Prunoideae. Generalization to systematic pomology of a method to determine the shape of leaves and fruits.**)

Agron. Lusitana 1943 : 5 : 251-77.

A description is given of a method of measuring the leaves and fruits of pome and stone fruit varieties, useful in varietal identification.

892.

HANSEN, N. E.

634.1:575(78.3)

634.835-2.111-1.521.6:575(78.3)

Northern plant novelties for 1945.

42nd Rep. S. Dak. State Hort. Soc. 1945 : 57-60.

The following new fruit varieties, developed at the South Dakota State College, are described:—The Hansen seedless and one-seeded Sodak pears have been produced from the cross *Pyrus sinensis* x Marguerite Marillat. Both have gritless flesh of good quality, and are high-yielding, winter hardy and resistant to fire blight.

The Kasha apple is a large-fruited cooking variety selected from Wolf River.

The Ata crab apple, developed from the cross Sasha apple x Red Flesh crab apple (*P. malus* var. *Niedzwetzkyana*), is distinguished by red flesh, subacid flavour and good quality. The Kensib crab apple, from the cross Kentucky Mammoth wild crab x Siberian Dolgo crab apple, has white flesh, keeps all the year round, and is suitable for use in sauces. The bitterness of the wild crab greatly reduces the acidity of Dolgo.

A brief account is also given of winter hardy intraspecific and interspecific hybrid grapes.

893. SHAW, J. K. 634.11(74.4)
Descriptions of apple varieties.
 Bull. Mass. Agric. Exp. Sta. 1943 : No. 403 : Pp. 187.
 Illustrated descriptions are given of common apple varieties. The bulletin is the result of 25 years' observations.
894. DORSEY, M. J. 634.11:575(77.3)
A progress report on the apple breeding project.
 Trans. Ill. Hort. Soc. 1944 : 78 : 98-106.
 A brief account is given of the breeding programme begun in 1908. In recent years, Aitken, Delicious, Golden Delicious and Jonathan have been crossed as seed parents with several other commercial varieties.
 In breeding for early ripening Yellow Transparent has been crossed as seed parent with several established varieties.
895. ALDERMAN, W. H. *et al.* 634.11:575(77.6)
Two new apples.
 Minn. Hort. 1943 : 71 : 21-22.
 The variety Victory is a new introduction resembling McIntosh but is more winter hardy, a more consistent bearer and more resistant to scab; it is more susceptible to fire blight. Fireside is a winter variety with superior dessert quality, adapted to the climate of Minnesota; it usually fails to colour completely. The parentage of neither variety is known with certainty, but the former probably had McIntosh as one parent.
896. VERNER, L. 634.11:575.12(79.6)
The Payette and Idagold apples.
 Circ. Univ. Idaho Agric. Exp. Sta. 1944 : No. 89 : Pp. 3.
 Payette and Idagold are new dessert apple varieties. Payette has been produced from the cross Wagener x Ben Davis. The fruit is larger than that of either parent, and in form resembles Wagener. Idagold has been derived from the cross Wagener x Esopus Spitzenburg. Its fruit resembles that of the latter parent in size and form, but shows considerable variation. Both varieties retain their quality until April or longer.
897. TARASENKO, G. G. 634.11:575.127.2:576.16
(*Malus prunifolia* and its origin).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : No. 3 : 31-38.
 As *Malus prunifolia* is of value as stock for the northern parts of the U.S.S.R. and Siberia, a study of its origin has been made.
 Notes are given on the history of the species, its botanical description and geographical distribution, with comments on the findings of other investigators.
 The observations here recorded have included the morphological study of (1) numerous forms of *M. prunifolia*; (2) hybrids of *M. baccata* with the cultivated apple and various wild species; and (3) both species and their seedlings by comparing herbarium material.
 Artificial crosses of *M. baccata* with cultivated apples produced *M. prunifolia* and the author concludes that *M. prunifolia* Borkh. has originated by natural back-crossing of *M. baccata* with cultivated forms growing in proximity.
898. EINSET, J. 634.11:576.356.5:575
The spontaneous origin of polyploid apples.
 Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 91-93.
 In chromosome counts of the root tips of approximately 1740 seedlings from diploid parents, four tetraploids and three triploids were found. Among a total of over 500 seedlings grown from triploid varieties, ten tetraploid seedlings with 68 chromosomes and one seedling with 71 chromosomes were obtained. The possible origin of the triploid and tetraploid forms is discussed. The tetraploids are to be crossed with diploid varieties to produce a large number of triploids, in order to determine whether the triploids are superior to the diploid apples in various qualities.

899. BLAKE, M. A.,
EDGERTON, L. J. and
DAVIDSON, O. W. 634.11:581.143:578.088
Standards for judging the growth status of apples in New Jersey.
Bull. N.J. Agric. Exp. Sta. 1945 : No. 715 : Pp. 36.

A discussion is given of the value of the spur leaves, the dormant spur buds, the measurements of the first and second year wood and other characters as an indication of the state of growth in fruit bearing trees of several varieties.

900. HOWLETT, F. E. 634.11:581.162.3:581.145.2(77)
Pollination and fruit setting of the apple tree in the North Central States.
Trans. Ill. Hort. Soc. 1944 : 78 : 325-36.

Pollination and fruit setting are discussed with reference to several factors.

901. ROBERTS, R. H. 634.11:581.162.3:581.46
Factors affecting apple setting.
Trans. Ill. Hort. Soc. 1944 : 78 : 118-24.

A discussion is given of the relationship in several varieties between the floral structure, which determines the mode of collecting nectar by the bee, and the initial fruit set.

902. ROBERTS, R. H. 634.11:581.162.3:581.46
Blossom structure and setting of Delicious and other apple varieties.
Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 87-90.

It has been observed that the structure of the flower of Delicious is such that honey bees are able to extract the nectar without effecting pollination. A discussion is given of the relationship between the structure of the blossom, or the mode of nectar extraction by the honey bee, and the fruit-setting qualities of different varieties.

903. HANSEN, E. 634.11:581.47:581.1
Quantitative study of ethylene production in apple varieties.
Plant Physiol. 1945 : 20 : 631-35.

The production of ethylene by the stored fruit has been investigated in five varieties and in relation to several factors.

904. WINTER, J. D. 634.11:581.6(77.6)
Cold storage studies with Minnesota-grown apples.
Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 143-44.

Cold storage tests of 15 varieties are reported.

905. HOUGH, L. F. 634.13-2.3-1.521.6:575(77.3)
The new pear breeding project.
Trans. Ill. Hort. Soc. 1944 : 78 : 106-13.

Promising material for breeding for resistance to fire and leaf blights and improved winter hardiness is described. Recently crosses have been made involving this promising material and commercial varieties. In particular, Pai Li, a Chinese commercial variety, and several *P. ussuriensis* seedlings show marked fire blight resistance.

906. GOLUŠKO, I. L. 634.21:576.16
634.21-2.111-1.521.6:575.127(47)
(The origin of the black apricot).
Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
1941 : No. 1 : 175-79.

On account of their reliable yields and resistance to spring frosts, the group of forms of apricot belonging to *A. dasycarpa* Pers. and *A. leiocarpa* Kost, regarded by some authors as natural hybrids between the apricot and *P. cerasifera* Ehrh., are recommended as promising breeding material and as planting material for regions less favourable to apricot cultivation. Of the group in question, one variety Tlor-Tsiran, was crossed in 1931 at the Melitopol Regional Fruit Station with some of the best cultivated varieties. The cross is a difficult one.

Trees in bearing from large scale sowings of seed from open-pollination of Tlor-Tsiran have in the author's opinion thrown light on the true nature of the origin of the varieties of the group. He believes the original cross from which Tlor-Tsiran came was *P. cerasifera* x *A. vulgaris*.

One of the forms (No. 7) resulting from open-pollination is specially recommended for cultivation and for use in further breeding because of its large fruits, frost resistance and high quality.

907. KOSTINA, K. 634.21:576.16(47)

(The origin and evolution of cultivated apricots).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)

1941 : No. 1 : 165-74.

Many species of *Armeniaca* are discussed from the standpoint of their distribution in the U.S.S.R., China, Japan, America and European countries; their systematic relations *inter se* and with other genera; old and new forms of the apricot with comments on their great diversity, their value and their geographical distribution; the role of cultivation and selection in their improvement; the range of variation in the cultivated apricots and their value for regions of the U.S.S.R. where sugar from beet or cane is not obtainable.

The different trends of evolution in Asia and in Europe have been influenced by the regional requirements and customs, and of the various countries, e.g. Central Asia, for which forms giving a high quality of dried fruit with high sugar content have been successfully bred.

Conditions of growth, and natural and artificial selection in different environments, have also affected biological characteristics and have led to the establishment of geographical groups of varieties differing in resistance to disease and cold, time of flowering (forms from the east being earlier than more westerly types), sexual reproduction (e.g. self-sterility and cross-fertility), germination capacity, etc.

The part also played by interspecific and intergeneric hybridization in the evolution of the cultivated apricot is exemplified by reference to apricots of the Far East, Northern China and Japan, Central Asia and Michurin's varieties. In recent years the author has succeeded by artificial hybridization of the apricot with the myrobalan in obtaining a yellow-fruited *Armeniaca dasycarpa* with pubescent fruits like the apricot. Similar hybrid origin is attributed to the glabrous fruited apricot-plum *A. leiocarpa* which has the purplish fruit of *A. dasycarpa* combined with many intermediate characters between the apricot and the myrobalan and comprising forms of a lighter colour. Such forms are evidently derived from crosses between the glabrous fruited apricot, common in Central Asia.

Among the intergeneric crosses in which the apricot has been used those with the late flowering representatives of the stone fruits, and especially with some of the domestic plums, are of special interest, as shown by work at several stations; the hybrids are distinguished by late-flowering and increased cold resistance, and should be useful in breeding work.

Systematic apricot breeding has not played any considerable role so far in the evolution of the cultivated form. The relative value of Asiatic and European forms in future breeding programmes is summarized.

908. BOGOLJUBOVA, O. P. 634.22

(The Ussururian White Plum).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)

1941 : No. 1 : p. 192.

This plum (*Prunus triflora* Roxb. var. *koreana* Kom.) is described. It is exceptionally frost resistant but flowers too early. The fruit is big for the variety, has a pleasant flavour and keeps for 17 days in a cool room; it can be used for dessert and various confections; its chemical composition is given. Trees and nursery stock are being raised at Krasnyĭ Paharj Experiment centre.

909. BAILEY, J. S. 634.22:575(74.4)

The beach plum in Massachusetts.

Bull. Mass. Agric. Exp. Sta. 1944 : No. 422 : Pp. 16.

The beach plum (*Prunus maritima* Marsh.), a native wild plum, is described. Selections have been obtained as material for a future breeding programme.

910. TETEREV, F. K. 634.23:575(47)

(Michurin's varieties of sour and sweet cherries in the Leningrad province).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)

1940 : No. 3 : 17-20.

The origin and performance of three varieties of sour cherries, Ideal Michurina, Plodorodnaja

Michurina (Michurin's Productive) and Krasa Severa (Northern Beauty), bred by Michurin, when tested near Leningrad, are described.

The importance of extending sweet cherry cultivation northwards and especially towards the Leningrad area is stressed. One of the important varieties for this purpose is the Kozlovskaja Michurina variety which, though bred by Michurin, is here described for the first time. It is fairly frost resistant and could be used for breeding operations in the Leningrad area.

911. FRENCH, A. P. 634.23:578.088(74.4)

Plant characters of cherry varieties.

Bull. Mass. Agric. Exp. Sta. 1943 : No. 401 : Pp. 23.

A scheme of varietal identification for different types of cherry is presented. Notes on 42 varieties are included.

912. BEKETOVSKIĬ, D. N. and ŠELJUTO, M. I. 634.24:581.44:575.127.2.061.633

[The biological characterization of the first generation (F₁) of the heterogeneous form of the steppe-cherry (*Prunus chamaecerasus* var. *pendula* Dipp, *foliis variegatis*)].

Botaničeskii Žurnal (J. Bot. U.R.S.S.) 1945 : 30 : 77-94.

It is believed that no other example of this species, combining the characters of variegated foliage and weeping branches, has been recorded. It was grafted on a vigorous stock but nevertheless grew feebly, dying in 1930, though not before it had been propagated by means of cuttings. These were grown where there were no other trees of *P. Chamaecerasus*, but several cultivated varieties of *P. Cerasus*, the pollen of which accordingly fertilized the flowers of the weeping and variegated cherry. The resulting fruit were vernalized, planted, and seven hybrid seedlings reared from them. These are described and discussed in detail in the present article, the purpose of which is to examine the data provided by observation of the hybrids during growth in relation to the hypothesis of Koržinskii (1899) that the hybrid progeny of remotely related parents are able to bear but little fruit, but that in the generations which follow fruit-bearing increases.

None of the young hybrid trees developed foliage which was both variegated and weeping; some bore either the one character or the other, the remainder bore neither; but whatever characters of either parent were in evidence, none was dominant, which accords with Michurin's statements to the effect that if, as in this case, the parents of a hybrid are reared in a locality to the conditions of which they are not accustomed, they cannot transmit any of their characters in sufficient strength to make them dominant in the progeny.

During growth, attention was paid to the following manifestations in the hybrids: the dates when the buds began to swell and open, the flowers to emerge, the fruit to reach maturity, and the leaves to fall. It was noticed that although the hybrids flowered abundantly few fruit were formed, and some of the trees formed no fruit at all. Evidence regarding the duration of flowering, vegetative vigour, the setting of fruit, and the viability of the pollen leads to the conclusion that the hybrids lacked vigour and their sexual reproductive system was deranged, but that there were some signs of change, as time went on, which indicated a slight increase in the vigour of fruit formation, though it cannot be predicted how far this increase will develop in the progeny succeeding the present generation of F₁ hybrids. It may take a long time.

The work of Michurin and Lysenko does, however, suggest the possibility of its being hastened by means of grafting. But before this means is employed, the deranged reproductive system referred to above should prove advantageous to the plant breeder, enabling him to guide the development of the hybrids in the direction he desires.

I. Z.

913. BLAKE, M. A. 634.25:575(74.9)

Better peaches from scientific breeding.

N.J. Agric. 1943 : 25 : No. 4 : 7-8.

A short review is given of the peach breeding achievements of the New Jersey Experiment Station, also of the methods utilized.

914. WEINBERGER, J. H. 634.25:575.247(75.8)

Newer peach varieties.

Eastern Fruit Gr. 1944 : 7 : 10, 16, 19.

Short notes are presented on the following peach varieties: Sullivan (= Sullivan Early Elberta, = Earlyberta), Redelberta, Kalhaven, Summecrest, Halehaven, Fireglow, Redhaven, Raritan

Rose, Early Red Fre, Trigem, Newday, Sunhigh, July Elberta Valiant, Veteran and Vedette. The variety Sullivan arose as a bud sport of Elberta, from which it differs in being a week earlier.

915. CARLSON, R. F. and
TUKEY, H. B. 634.25:581.48:581.142(73)
Differences in after-ripening requirements of several sources and varieties of peach seed.
Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 199-202.

Each variety and seed lot studied was found to have specific after-ripening requirements.

916. CULPEPPER, C. W. and
CALDWELL, J. S. 634.25:581.6
Studies in preservation of eastern freestone peaches.
Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 241-45.

The results of recent tests of varietal suitability for canning, dehydration and the making of preserves are summarized (Cf. *Plant Breeding Abstracts*, Vol. XV, Absts 1486 and 1487).

917. DETJEN, L. R. 634.25-2.111-1.521.6(75.1)
634.25:581.162:631.547.6(75.1)
Peach varieties by comparison.
Circ. Del. Agric. Exp. Sta. 1945 : No. 17 : Pp. 10.

The report gives data for many varieties on the resistance of flower buds to frost and on blossoming and ripening times.

918. CRONQUIST, A. 634.431:582(73)
Studies in the Sapotaceae—IV. The North American species of *Manilkara*.
Bull. Torrey Bot. Cl. 1945 : 72 : 550-62.

A revision of the genus *Manilkara* is presented.

919. COX, L. G. 634.5:581.331.2:578.08
Preliminary studies on catkin forcing and pollen storage of *Corylus* and *Juglans*.
34th Rep. Nth. Nut Gr. Ass. 1943 : 58-60.

A report is given of the following preliminary investigations on pollen in *Corylus* material and *Juglans Sieboldiana*: (1) the optimum temperature and sugar concentration required for germination, (2) the effect of temperature and humidity during catkin forcing upon viability, (3) the effect of extracts from the catkin tissue upon germination, and (4) the conditions of storage.

920. COLBY, A. S. 634.51(77.3)
The Crath Carpathian walnut in Illinois.
34th Rep. Nth. Nut Gr. Ass. 1943 : 107-19.

An account is given of the Carpathian walnut strain introduced into American by Crath.

921. MUENSCHER, W. C. and
BROWN, B. I. 634.51:581.143.7:578.088(73)
A key to some seedlings of walnuts.
34th Rep. Nth. Nut Gr. Ass. 1943 : 62-63.

A scheme of identification is presented for one to three months' old seedlings of the common walnut species.

922. MACDANIELS, L. H. and
WILDE, J. E. 634.51.00.14(73)
Further tests with black walnut varieties.
34th Rep. Nth. Nut Gr. Ass. 1943 : 64-82.

Special attention is paid to methods of varietal evaluation.

923. GRAVATT, G. F. and
CRANDALL, B. S. 634.53-2.411.4-1.521.6(73)
The *Phytophthora* root disease of chestnut and chinkapin.
35th Rep. Nth. Nut Gr. Ass. 1944 : 83-87.

Selections of the four Asiatic species, *Castanea crenata*, *C. mollissima*, *C. Seguinii* and *C. Henryi*, have proved to be highly resistant to *Phytophthora Cinnamomi*. *C. sativa*, *C. dentata* and six native species of chinkapin showed susceptibility.

924. GRAVES, A. H. 634.53-2.421.9-1.521.6:575.12(74.7)

The Brooklyn Botanic Garden Chestnut Breeding Project.

35th Rep. Nth. Nut Gr. Ass. 1944 : 23-35.

An account is given of the work of crossing *Castanea crenata* and *C. dentata* and of crossing wild forms of *C. dentata* with pollen from various sources, in the attempt to produce a blight-resistant timber chestnut. The pedigree and type of the most promising seven years-old hybrids so far obtained are tabulated. One hybrid *C. mollissima* x (*C. crenata* 7-15-43 x *C. dentata*) has shown satisfactory blight resistance and an incomplete dominance of the *C. dentata* type.

925. BLAKE, M. A. and
EDGERTON, L. J. 634.531-2.421.9-1.521.6:575(74.9)

Experiences with blight-resistant chestnuts in New Jersey.

Bull. N.J. Agric. Exp. Sta. 1945 : No. 717 : Pp. 20.

Descriptions are given of the American (*Castanea dentata*), the European or Spanish (*C. sativa*), the Japanese (*C. crenata*) and the Chinese (*C. mollissima*) chestnuts. The Chinese chestnut exhibits most resistance to blight, a serious disease of the native species. A tree of the variety Boone, the result of a cross made in 1895 between the American chestnut and the variety known as the Japan Giant, has also proved to be blight resistant.

The improvement of the Chinese chestnut is in the initial stage in the United States. At New Brunswick observation work is in progress with seedlings of this species, the fruit of which were planted in 1926. Seedlings from this promising material and Boone are also being grown. Marked variability in form, growth rate, yield, the size and quality of the nuts, and winter hardiness have been found.

926. BATTEN, E. T. 634.58:575.42(75.5)

Two new strains of Virginia type peanuts.

Bull. Va. Polytechn. Inst., Agric. Exp. Sta. 1945 : No. 370 : Pp. 4.

Two improved high-yielding strains, Holland Jumbo and Holland Virginia Runner, derived from the intermixed varieties Jumbo and Virginia are described. The former gives a high percentage of large, attractively-coloured pods acceptable to the trade as unhulled goods, and large kernels, uniform in size and shape, suitable for confectionary purposes. The latter strain produces small pods well-filled with short, thick kernels. The kernels have high meat content, and are suitable for the manufacture of peanut butter and for oil purposes.

927. COLWELL, W. E. and
BRADY, N. C. 634.58:581.6:631.416.7

The effect of calcium on certain characteristics of peanut fruit.

J. Amer. Soc. Agron. 1945 : 37 : 696-708.

Previous investigations (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 433) have demonstrated marked differences in the nutrient requirements of different varieties. The present paper describes the effect of different supplies of calcium upon the size of the fruit cavity and the kernel development in the four varieties previously investigated, viz., Virginia Bunch, Spanish 2B, North Carolina Runner and White Spanish.

928. NIXON, R. W. 634.62:581.162.3:575.42(73)

Date culture in the United States.

Circ. U.S. Dep. Agric. 1945 : No. 728 : Pp. 44.

The botanical relationships of the date palm are briefly described. A detailed account is included of propagation by off-shoots, and methods of pollination and pollen storage. The selection of male palms is discussed with regard to time of blooming, number and size of flower characters, individual flower characters, compatibility, and metaxenia. Descriptions are given of 16 varieties originally imported as off-shoots.

929. WALDO, G. F.,
WIEGAND, E. H. and
HARTMAN, H. 634.7:575
634.711:575(79.5)

New berries from Oregon's plant breeding research.

Sta. Bull. Ore. Agric. Exp. Sta. 1943 : No. 416 : Pp. 11.

In the co-operative breeding programme of small fruits in Oregon, over 150,000 individual crosses have been made during the period 1921-1943. Descriptions are given of the five new

varieties which have been named and introduced since 1930, viz. the Corvallis and Brightmore strawberries, the Pacific and Cascade blackberries, and the Willamette red raspberry. The Willamette red raspberry, selected from a cross between Newburgh and Lloyd George, was released for commercial trial in 1943. In several tests in west Oregon it has outyielded Cuthbert, and produced firmer and larger fruit. In frozen-pack tests Willamette has been among the best varieties, and in canning tests its grade has been the same as that of Cuthbert.

930. SLATE, G. L. 634.7:575(73)
Newer small fruits.
 Amer. Fruit Gr. 1944 : 64 : No. 6 : 8, 21.

A brief account is given of promising varieties of red and black raspberry, strawberry and red currant, recently developed at the American and Canadian experimental stations.

931. 634.71:575(47)
 634.72:575(47)
 634.71:575.127.2(47)
 PAVLOVA, N. M.
(Initial material for the breeding and cultivation of bush fruits.)
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : No. 5 : 33-46.

The size and great variety of climatic and soil conditions of the U.S.S.R. make it necessary to provide a large assortment of varieties of berry fruits so that maximum yields of high quality fruit may be obtained.

The present paper aims at indicating (1) the main breeding problems for each type of berry and (2) the main features of the varieties and wild species suitable as initial material for breeding; it also offers assistance in raising the yield of the plantations in the northern regions of the country after the winter ravages of 1939-40. Details are given of Russian and other varieties of black and red currants, gooseberries and raspberries promising for breeding purposes, with observations on their economic and nutritional value and suggestions are made regarding possibilities of local or other varieties in the production by hybridization, etc., of types suitable for various regions.

The black currant, Slava Leningrada, is mentioned for its resistance to fungous diseases and also to mite, the latter being dependent on compactness of the buds. In the Far East crossing between *Ribes Dikusha* Fischer and European varieties has produced some promising hybrids and one, Primorsk Champion, is undergoing selection at the Vorošilov Fruit and Berry Experimental Station. Such forms are specially useful in regions where frost resistance is needed. For drought resistance *Ribes americanum* Mill. is recommended, while for Central Asia, crosses of the American with the black currant should be tried; the latter ripens earlier than the American and the berries do not fall so easily.

In breeding red currants for resistance to anthracnose the value of the large Siberian forms of *Ribes petraeum* Wulf and some of its hybrids with European varieties are specially mentioned. The sugar and vitamin C content of different varieties is recorded.

Reduction in the number of seeds is also a character that should receive attention from the breeder. *R. atropurpureum* C. A. Meyer, *R. Palczewskii* (Jan.) Pojar. and *R. manshuricum* Komar. which occur in Asiatic Russia are also regarded as of possible interest. An annotated list of varieties of interest to breeders is given.

With reference to gooseberries interspecific hybridization is thought to be the only method of producing an American type equalling the European in berry size and flavour.

Results with the first generation gooseberry hybrids from breeding operations begun in the U.S.S.R. in 1933 with American or European varieties crossed with Asiatic forms are enumerated with reference to differences in *Sphaerotheca* resistance, dominance of wild type habit and berry size.

The World Collection of raspberries includes over 600 varietal names.

The origin and distribution of the European and American raspberries are indicated.

Only the red forms are of industrial importance in the U.S.S.R.

Habit, number of spines, vigour of vegetative multiplication, yield, frost resistance and berry qualities are factors to be considered in the choice of varieties. Improvement may be achieved by intervarietal crossing of the red species with its subspecies, though it must be remembered that intervarietal crosses of the raspberry are often sterile; this defect with others was found in the cross of European varieties with Asiatic subspecies of the red form *Rubus Idaeus* L. subsp. *melanolasius* Focke, found in Siberia and the Far East.

Interspecific crosses of varieties derived from the red and the black types have often given good results; but the poor frost resistance of the black raspberry and its hybrid, the purple form, makes any successful selections unpromising for northern regions.

Varieties recommended for breeding are enumerated.

932. BAILEY, L. H. 634.71:582(73)
The genus *Rubus* in North America. X. Subg. V. *Idaeobatus*. Subg. VI. *Anoplobatus*.

Gentes Herbarum, Ithaca, N.Y. 1945 : 5 : 859-918.

This paper completes the monograph on the genus *Rubus* in North America, published in ten separate parts during 1941-45 (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1499).

933. KIČUNOV, N. I. 634.74-1.524:633.85(47)
(A valuable rose for the production of rose oil).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : No. 3 : 145-46.

Some French roses are described with special mention of the variety Parfum de l'Hay which is characterized by its remarkable fragrance, frost resistance, long flowering period and a high quality of oil. The writer suggests that it should replace the damask rose which is too susceptible to frost for cultivation in the central and northern parts of the U.S.S.R. He thinks the plants for testing should be imported as the authenticity of the Parfum de l'Hay grown in the U.S.S.R. may be doubtful. The variety is a triple hybrid comprising *Rosa rugosa*, *R. damascena* and the ever-flowering General Žakmino.

934. KATINSKAJA, JU. K. 634.75:575(47)
(The best varieties of strawberry for the northern and central zones of the Union).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1940 : No. 5 : 47-53.

In view of the economic and nutrient value of the strawberry the need is pointed out for extending the area of cultivation northwards in the U.S.S.R. and for ensuring a proper choice of pure varieties for the very varied conditions of the country. A system of official approval of tested varieties should be established. The introduction of new, or the use of local bred varieties is important.

The Institute of Plant Industry has made a selection of promising European and American strawberries and some of these new varieties which include frost resistant types, are described with indications of their suitability for various regions.

The main aims are the production of (1) early, high quality, high yielding varieties that stand transport; (2) late monoecious varieties of high quality and yield; (3) varieties with dark coloured fruits and flesh with a high sugar and acid content for processing; and (4) varieties for forcing under glass.

935. JOHANSSON, E. 634.75:575(48.5)
 Nyare erfarenheter om bärodling. **(Recent results relating to the growing of bush fruits).**
 Årsb. Jordbruksforskning, Stockholm 1945 : 183-94.

For suitable varieties the reader is referred to Dahl's latest list.

Though the Swedish official variety tests of bush fruits have not yet reached the stage when recommendations can be made, some suggestions as to suitable varieties of gooseberries, currants, raspberries, blackberries and strawberries to grow are included in this report on cultivation. Many are not of Swedish origin, but the strawberry Inga is mentioned as a cross made at Alnarp in 1924 between Frau Director Echtermeyer and Vicomtesse Hericart de Thury: it has bisexual flowers, is self-fertile and prolific and has done well in the Alnarp trials.

936. BRIERLEY, W. G. and LANDON, R. H. 634.75-2.111-1.521.6(77.6)
Winter behavior of strawberry plants.
 Bull. Minn. Agric. Exp. Sta. 1944 : No. 375 : Pp. 24.

Various investigations on the cold resistance of the strawberry plant included a test of several varieties over a period of ten years. Burgundy was found to be the hardiest variety. In general June bearing varieties showed a greater resistance to cold than the autumn bearing varieties.

937. MORRIS, H. E. and
AFANASIEV, M. M. 634.75-2.8-1.521.6:575(78.6)
**Yellows, a non-infectious disease of the progressive everbearing
strawberry in Montana.** ..
Tech. Bull. Mo. Agric. Exp. Sta. 1944 : No. 424 : Pp. 11.

The non-infectious yellows disease of the Progressive Everbearing strawberry in the Bitterroot Valley, Montana, is described. Montana Progressive is a selected seedling of Progressive Everbearing which has remained free of yellows for seven years. This variety has been in commercial use for three seasons, and offers the only known means of control of the disease.

938. MORRIS, H. E. and
AFANASIEV, M. M. 634.75-2.8-1.521.6:575(78.6)
**Montana Progressive strawberry. A yellows-resistant, everbearing
variety developed during research on yellows.**
Circ. Mont. Agric. Exp. Sta. 1945 : No. 181 : Pp. 2.

A description is given of the Montana Progressive strawberry, a yellows resistant selection of Progressive (for investigations on the nature of yellow cf. Abst. 937 above) which has been in commercial production for three years. The variety is highly resistant to leaf spot, and the flowers show considerable cold resistance. The spring crop is fairly good, and the autumn crop heavy. The berries are firm and aromatic, the dessert quality being good for an everbearing type.

939. HUSFELD, B. 634.835:575(43)
Forschungsziele und Ergebnisse im Weinbau unter besonderer Berücksichtigung der Rebenzüchtung. (**Research aims and results in viticulture with special reference to vine breeding**).
Forschungsdienst 1942 : Shft 16 : p. 519.
[From Züchter 1943 : 15 : p. 166].

The actual or potential repercussions of modern genetical research applied to vine breeding upon the various branches of wine production form the subject of this paper.

940. WILCOX, A. N.,
ALDERMAN, W. H. and
HARALSON, F. E. 634.835:575(77.6)
New grape varieties named.
Minn. Hort. 1944 : 72 : 4-6.

Four new grape varieties adapted to the climate of Minnesota are described. Red Amber is a sweet red grape of high dessert quality; Moonbeam is characterized by its large mildly flavoured silvery-green berries; Blue Jay is a sharply flavoured blue grape; while Bluebell is another blue grape but with a refreshing flavour. The parentage of these new varieties is uncertain, but in each case, Beta was probably one of the parents.

941. HUSFELD, B. 634.835:575.127.2(43)
Die züchterischen Möglichkeiten in Menge und Güte des Ertrages bei interspezifischen *Vitis*-Kreuzungen. (**The possibilities as regards quantity and quality of the yield in breeding by interspecific *Vitis* crosses**).
Wein u. Rebe 1943 : 25 : 4-28.
[From Züchter 1943 : 15 : p. 166].

A large collection at Müncheberg of *Vitis vinifera* (= E) x American species (= A) hybrids consisting mostly of F₂ and F₃ generations was used to study the range of variation of yield characters, some of which attained an unexpectedly high degree of expression, e.g. acid content, must weight and colour of the juice. The genetically conditioned differences in the onset of ripening of the berries have little influence on the must weights and acid contents of the individual vines.

As regards effect of climatic conditions on acid content, three groups of vines were identified: (1) those showing a lower content under favourable weather conditions than in cold and sunless seasons; (2) those which, under similar conditions, have a higher content; and (3) those that are mainly neutral in behaviour and therefore likely to be specially useful for breeding.

The segregation observed of types with deep red juice in E x A (Riparia) populations might open up a new method of obtaining red wines.

Having discussed some successful results in the $E \times A F_2$ and F_3 populations, still better results obtained by back-crossing to *V. vinifera*, are then described, including the particular features of one seedling thus obtained.

The mode of inheritance of the different characters is discussed in the light of data from the extensive Müncheberg material, and deductions bearing on vine breeding are drawn.

942. NEGRULJ, A. M.

634.835:576.16

(**The evolution of cultivated grapes**).

Priroda (Nature) 1940 : No. 4 : 37-46.

It is generally supposed that the cultivated vine has arisen from the wild Eurasian vine *Vitis vinifera* ssp. *silvestris* Gmel.; several features which this species has in common with the cultivated vine are enumerated in support of this viewpoint. The southern populations of the wild vine have a larger proportion of forms resembling the cultivated vine than the populations from more northerly zones; the evidence available indicates however that these are not primordial wild forms but products of natural hybridization with cultivated forms or even in some cases natural seedlings of cultivated grapes.

The wild vines possess a number of features of value for breeding purposes, such as resistance to phylloxera, various fungous diseases, drought, saline conditions, etc. The total range of variation however, is wider in the cultivated species, which would be expected, it is pointed out, on Darwinian principles. A brief account is given of this variation as observed in a number of the main morphological and other characters of the fruit.

The question arises as to how this great variation has arisen. The hermaphrodite flowers of the cultivated species are thought to have evolved from the wild type by a series of mutations; such mutations have actually been observed in certain interspecific hybrids. Once having arisen, the mutant type would quickly become established by unconscious selection. Seedlessness, which is conditioned by a number of hereditary factors, must also have arisen by prolonged artificial selection of forms showing a tendency towards the production of parthenocarpic fruits. The large fruits which distinguish the cultivated from the wild species are conditioned by polymeric recessive factors, and are thought to have arisen by continued selection of bud mutations or the favourable products of segregation. Bud mutations are thought to account for the origin of such characters as the different fruit colours and the muscat flavour too.

The origin of the cultivated type has probably occurred independently in a number of different localities, and the forms have later become mixed and still further extended the range of variation. The dessert types are apparently of more recent origin than the wine types, and the most ancient centre of domestication is regarded as Transcaucasia, Asia Minor and Near Asia; the features of the varieties from this area are described, and contrasted with those of later origin such as the French and German varieties on the one hand and the varieties of Persia, Afghanistan and neighbouring countries on the other.

943. BERGMAN, H. F. and

634.835:581.192(75.2)

MAGOON, C. A.

The tartrate content of Maryland-grown American grape varieties.

Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 253-55.

Analysis of tartrate content has been made in 25 varieties.

944.

634.835:581.48:575(74.7)

Grape breeding.

J. N.Y. Bot. Gdn 1945 : 46 : p. 252.

A note is given on the work of breeding seedless grapes at the Agricultural Experiment Station, New York State. A total of 307 individual seedlings have been produced which bear seedless or almost seedless fruits.

945. SNYDER, E. and

634.835:581.6(73)

HARMON, F. N.

Temperature and maturity in relation to raisin production.

Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 249-52.

Data are given for five varieties of *Vitis vinifera* on (1) the relationship between the number of days from blossoming to ripening and the average sugar percentage at harvesting, and (2) the relationship between the composition of the fresh fruit and that of the resulting raisins. The effect of temperature upon sugar development is discussed. The number of day-degrees above a

mean temperature of 50° F. during the period from blossoming to ripening varied with variety, indicating the earliness or lateness of a variety in reaching the required sugar percentage. Fresh grapes with high sugar percentages gave a greater yield of raisins in proportion to the fresh weight of fruit, and a slightly higher sugar content and a lower acid content in the resulting raisins.

FORESTRY 634.9

946. *SYLVÉN, N. 634.97:575(48.5)
 Årsberättelse över Föreningens för växtförädling av skogsträd verksamhet under år 1944. (*Annual report on the work of the Association for Forest Tree Breeding during the year 1944*).
 Medd. Fören. Växtföräd. Skogstr. 1945 : No. 39 : Pp. 50.

Co-operation was maintained with the State Forestry Research Institute [Statens Skogsförsöksanstalt] and other official and unofficial bodies and contacts were made with the Society for Practical Forest Tree Breeding [Sällskapet för Praktisk Skogsförädling] and the Society for the Promotion of Oak Cultivation [Sällskapet för Ekodlingens Främjande]. The international larch provenance trials have been laid out at Ekebo.

The proposed Uddeholm Station has been established and a report on its work is given.

In co-operation with the Scientific Academy of Engineers [Ingeniörsvetenskaps Akademien] progress was made with the chemical analysis of the timber of spruces differing in branching habit, and useful data for future breeding operations were obtained. The special investigations bearing on the relations between race and local conditions on the one hand and the quality and economic value of the timber on the other were continued. A study of the relation between the chemical constituents of (1) the stem, (2) top shoot, and (3) the wood of cuttings was also begun in 1943 with three different types (clones) of aspen and four different species of poplar.

C. L. Kiellander's report on the work of the main Institute contains the following information:—

Spruce

Selection for cold resistant types was continued. Some remarkably promising polyploids obtained from colchicine treated seed have been produced at Ekebo in 1941 and 1942. The relative value of diploid and polyploid forms has still to be ascertained. Chromosome determinations of available colchicine treated plants showed that in eight out of 120 plants, all the roots were tetraploid. Stomatal measurements are to be made in 1945 on promising material.

Pine

Pollination of grafts in the greenhouse was carried out. Work was done on long day types and on colchicine treatment of seed.

Larch

Surveys and mother tree selection formed part of the programme of research. Siberian larch for breeding were obtained by grafts with Raivola types.

Crosses were made between European and Japanese larch to obtain *L. eurolepis* with its superior growth rate, stem form and resistance to canker.

Other Conifers

Work is continuing as already reported (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 357). A specially winter hardy lot of Sitka spruce is now growing vigorously.

H. Johnson reports on deciduous trees as follows:—

Aspen and Poplar

Nilsson-Ehle's 76-chromosome (tetraploid) aspens which flowered in 1943 were used to pollinate common aspens and the progeny showed approximately 57 chromosomes (86.9% having between 54 and 59 chromosomes). About 30,000 hybrids of this kind are being raised and a detailed report on this work and the Canadian x Swedish aspen crosses is to be published.

The tetraploid aspen is also being used to study the effect of chromosome number upon growth. Crosses between tetraploids and triploids have given pentaploids (95 chromosomes) and colchicine treatment of triploid seed has produced seedlings with over 90% larger stomata than usually occur. These plants are probably, at least partially, hexaploid.

Some hybrids were also made with material from the best Norwegian aspens supplied through the Norwegian Aspen Improvement Fund [Norska aspenförädlingen—Fröhlich's Fond].

* An extended abstract of this paper is on file at the Bureau.

Birch

Hybridization work has consisted primarily in interspecific crosses and curly birch [masurved-sbjörk] crosses, and some valuable types for use as parents have been obtained.

Attempts were also made to produce useful birch types with high chromosome numbers. Three triploid birches (*Betula verrucosa*) from various districts were treated with colchicine and, though triploid birches are highly sterile, a little germinable seed which may produce high chromosome plants was obtained.

Beech

The first comparative trials were planted in 1941 with two-year-old plants from nuts harvested in 1941 from élite trees and stands in various districts.

Oak

The first oak grafts for breeding purposes were carried out in the light-controlled greenhouse at Ekebo; bottle grafting of scions from 14 different élite trees (*Quercus Robur* and *Q. sessiliflora*) from various districts was used.

The work on the times of leaf emergence and leaf fall in the oak has already been recorded (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 361).

A smaller experiment with *Q. borealis maxima* (= *Q. rubra* Du Roi) included progeny from two trees of this species in Grensholm.

Alder

Though the alder does not respond nearly so well as ash or elm to grafting (bottle method), the process can be used to obtain dwarf trees with fruiting branches.

In 1944 varietal and interspecific crosses of alder were made.

Experiments on the multiplication of *A. glutinosa* x *A. incana*, *A. incana*, *A. viridis* and *A. rubra* by herbaceous shoot cuttings treated with β -indole acetic acid suggest that *A. glutinosa* is more difficult to multiply in this way than the other three species and that *A. viridis* and *A. incana* show a much greater tendency to root formation, while *A. rubra* forms weak roots.

Mother plants for further experiments on root formation in layered plants of *A. glutinosa* have been chosen from plants raised from seed treated with colchicine in 1940.

Material is being raised from crosses of *A. glutinosa* with *A. rubra*, *A. cordata* and *A. incana*. Some *A. japonica* and *A. hirsuta* var. *sibirica* seed from the Göteborg botanical garden failed to germinate owing to the absence of suitable pollen and, possibly, also to interspecific sterility.

Ash

Increment and anthocyanin determinations on three-year-old seedlings suggest that dark coloured plants with a high anthocyanin content in the bark were more vigorous than those containing less anthocyanin.

In bottle grafting *Fraxinus excelsior* was used as the stock for élite scions from *F. americana* and a putative specimen of *F. washingtoniana*. Grafts of *F. americana* and *F. excelsior* from Skärålid were 100% successful whereas only 40% of *F. excelsior* grafts from Tureholm took. The number of flower buds formed was too low to allow of crosses being made. Of the 1943 cuttings of *F. americana* and *F. pennsylvanica*, 35% (with hormone treatment) and 0% (without) of the former species took root and 60% and 50% respectively of the latter.

Elm

Seed was plentiful and about 20,000 1 + 0 plants at Ekebo are now ready for transplanting. Only the seed from Kärrebogårde, nearly all gathered from asynaptic "pseudotetraploid" mother trees, failed almost entirely to germinate.

Two comparative trials were laid out.

Using only bottle grafts with flower buds, the following crosses were carried out in the light-controlled greenhouse at Ekebo: Series I, asynaptic x asynaptic elm; Ser. II, asynaptic x normal; Ser. III normal x asynaptic; Ser. IV, normal x normal. In series I, 15 plants out of 19 were tetraploid, and four were triploid; in series II, one plant was tetraploid, and the remainder were triploid, as were also the plants in series III. The probable cytological basis of these results is indicated. The tetraploids grew more slowly, had darker green, sharply dentate leaves, and are irregular in form, in contrast to the triploids and diploids each of which was uniform.

Some 1 + 1 triploids from seed set under conditions of open-pollination of elm No. 1 Kärrebogårde are undergoing further observation.

Results obtained in grafting of *Ulmus americana* are mentioned.

Cytological, Chemical and Low Temperature Laboratories

Samples numbering 1,713 were taken for cytological study from most of the species cited in this report during 1944. Detailed cytological studies of the crosses are in progress. Special studies, such as pollen investigations, measurements of stomata, determination of the intensity of assimilation and transpiration and the osmotic pressure in triploid aspens, were also undertaken. The chemical laboratory completed the analyses of samples from spruce whose type had already been determined in collaboration with the State Forestry Research Institute [Statens Skogs-försöksanstalt].

The successful freezing experiments with spruce in 1943 were continued in 1944.

The individual reports from the Norrland, Dalfors, Brunsberg and Linköping Branch Stations include the following points of interest to breeders:—

Photoperiodism experiments were made with pine, spruce and birch at Dalfors.

Progeny tests at Brunsberg included hybrids (1) obtained by artificial crosses of *Betula verrucosa*, and artificial crosses of grey and glass birch (*B. pubescens*), (2) progenies of wart birch (*B. verrucosa*) and of glass birch (*B. pubescens*) from trees left to flower under conditions of open pollination, and (3) species crosses between *B. verrucosa*, *B. papyrifera* and *B. japonica*.

Artificial cross-pollination of three élite pines in different districts gave a good set of cones; reciprocal crosses were made in most cases. The Station has now over 1.5 million two-year-old spruces for sale, and 590,000 for progeny tests. The year's commercial sowings now comprises 1.3 million spruces. In the summer about 57,000 pines and about 280,000 spruces for progeny trials were raised.

At Linköping larch crosses were made, mainly with *Larix decidua*, *L. sibirica* and *L. leptolepis*. Selfings, back-crosses to the maternal parent and half-sib crosses were also made with pine, chiefly to study the effect of inbreeding.

947. SYLVÉN, N. 634.97:575(48.5)
Föreningen för växtförädling av skogsträd. Styrelseberättelse för år 1944.
(**The Association for Forest Tree Breeding. Report of the Board, 1944.**)
Svensk PappTidn. 1945 : 48 : 113–16.

Particulars are given relating to the establishment of the Sundmo Branch Station, which, when completed, should be of special importance for Norrland, and to the development and extension of the Brunsberg and Ekebo stations.

Funds and grants received by the Association and the organization of the sale of improved types of trees are also discussed.

948. SYRACH LARSEN, C. 634.97:575(48.5)
Skovtrae foraedling i Gävleborg Län. (**Forest tree breeding in Gävleborg district.**)
Dansk Skovforen. Tidsskr. 1945 : No. 9 : 394–97.

This account of a Swedish tour describes the various élite conifer stands and trees in the district. The aims and equipment of the Kratten Experimental Station and Forestry School (Skosvårds-gård) near Storvik are highly praised. Many of the trees chosen for seed production had been selected after their silvicultural type and botanical characteristics had been duly recorded in detail (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 755 and Vol. XIV, Abst. 643). The Swedish selections of élite conifers, progeny testing and plans for finding more stands of superior quality were also subjects of interest to the visitors.

949. JENSEN, H. 634.97:575.14:631.521.5
Inavelsrisken vid skogsfröplantager. (**The risk of inbreeding in forest tree seed plantations.**)
Svenska SkogsvFören. Tidskr. 1945 : 43 : 178–80.

The author here defends and further explains his method of production of forest tree seed in plantations (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 641) against criticism by Nils Sylvén and the Ekebo staff, emphasizing the danger of degeneration due to inbreeding in such plantations (cf. *Plant Breeding Abstracts*, Vol. XV, p. 183).

950. 634.97–1.531.12(48.5)
Plan utarbetad för frö- och plantförsörjning. (**Plan worked out for supplying seed and plants.**)
Svensk PappTidn. 1945 : 48 : 149–50.

A committee has been appointed to examine the question of the provision of seed and plants by

the silvicultural boards. The country will be divided into supply areas each with a joint committee of organization.

The forests are to be surveyed and mapped from the point of view of their suitability for seed collection. A uniform classification scheme for seed will be drawn up and a forest cultivation programme formulated in collaboration with the forestry board and the forestry research institutes.

951. THAARUP, P. 634.975:575.127.2(48.9)
Bastarden Sitkagran x Hvidgran. (**The hybrid Sitka spruce x white spruce**).
Dansk Skovforen. Tidsskr. 1945 : No. 9 : 381-84.

Where Sitka and white spruce grow side by side, crossing is so extensive that it is impossible to obtain pure Sitka seed. Reports on the performance of the hybrid in several plantations in Denmark show that it is inferior in form, the trunks are inherently badly shaped, and more or less bent and crooked.

Hence, in collecting Sitka spruce seed, all possibility must be excluded of hybridization with nearby white spruce. The hybrids appear to have no advantages as compared with Sitka. In the frost of 1938 they suffered just as much damage as other species; nor are they any more resistant to wind damage nor any less exacting in regard to soil conditions.

952. LANGLET, O. 634.975:575.3:631.531.12(48.5)
Om möjligheterna att skogsodla med gran -och tallfrö av ortsfrämmande proveniens. (**On the possibilities of forest cultivation with spruce and pine seed of distant provenance**).
Svenska SkogsvFören. Tidskr. 1945 : 43 : 68-78.

As a result of natural selection, phenotypically and genetically different types of forest trees are adapted to different regions. The results of this interaction between the tree and its environment are examined with special reference to the provision of spruce and pine seed in Sweden in areas where seed production is very low and the importation of suitable seed from other parts of the country is necessary.

Among the factors that must be taken into account in choosing seed of suitable provenance for a particular district are the hereditary physiological characteristics which find expression as the daily and annual rhythm of development and must suit the length of day and vegetation period of the locality to which the seed is transferred.

The difficulties of formulating regulations for seed transfer are exemplified by a detailed discussion of the requirements in regulating the transfer of spruce and pine seed in Sweden to districts where seed is scarce.

953. BEVERSLUIS, J. R. 634.975:578.088
De micrografische identificatie van conifere houtsoorten. (**Micrographical identification of types of conifer wood**).
Meded. LandbHooges. Wageningen 1943 : 47 : No. 2 : Pp. 39.

This list is based on the same system evolved by the author in 1925 for identifying wood; each kind of wood is described according to a list of distinguishing features numbered in sequence, so that the characterization of a type of wood can be expressed by a series of numbers.

Advantages as compared with any dichotomous system of identification are that (1) the total of all characters are always examined and a doubtful decision about the presence or absence of a particular character does not seriously affect the identification; (2) amendments and additions can be made without difficulty to the description and there is no limit to the new varieties of wood that can be added if necessary.

The author does not claim to have spoken the last word on the subject and he looks forward to receiving constructive criticism from readers or users of his classification.

954. BURGER, H. 634.975:581.143:581.02
Holz, Blattmenge und Zuwachs. V. Mitteilung. Fichten und Föhren verschiedener Herkunft auf verschiedenen Kulturorten. (**Wood, amount of foliage and increment. Communication V. Spruce and pine of different provenances, cultivated on different sites**).
Mitt. Schweiz. Ant. Forstl. Versuchsw. 1941 : 22 : 10-62.

Spruce from Winterthur and the Engadine were grown in Solothurn and Bergün to ascertain the effect of locality (including altitude) and race on foliage production, increment and properties of the timber produced.

Similar experiments were also conducted with pine.

The results obtained showed the complexity of the relation between the different factors considered and how difficult it is to distinguish clearly between the influence of the locality of cultivation and that of origin of the seed.

VEGETABLES 635

955. MCRÆ, L.

635(73)

Garden newcomer's you'll like.

Bett. Homes & Gdns 1944 : 22 : No. 8 : p. 12.

Brief descriptions are given of the lettuce variety Oak-leaf, a heat-resistant introduction with good flavour, the vegetable soya bean Bansei, and the pea varieties Dwarf Gray Sugar and Melting Sugar, both of which bear edible pods.

956.

635:575(48.5)

NILSSON, F.

635.53-2.482-1.521.6

Växtförädling av köksväxter. (**Breeding of vegetables**).

Årsb. Jordbruksforskning, Stockholm 1945 : 171-82.

The early history of the breeding of horticultural crops in Sweden is outlined with notes on the various seed firms engaged in the breeding of new varieties of vegetables. The value of such varieties is recorded in the annual reports from official trials at Alnarp (reviewed in *Plant Breeding Abstracts*). The present paper is confined to a short review of the present position in the breeding of the various vegetable crops:—

Carrot

Breeding has been highly successful and though many varieties have foreign names, the Swedish strains often differ from the originals, and one variety, *Regulus*, has even been given a Swedish name. Resistance to disease, keeping quality, winter hardiness in seed raising, carotene content, quality and yield are all points which should receive attention in the intensive breeding now in progress.

Parsnip

Successful breeding has produced the approved varieties *Student* and *Halvlång*.

Radishes

Strains of three varieties *Amager Driv Oval* (*Amager Forcing Oval*), *Gaudry* and *Saxa* and of three varieties for growing in the open have been approved. Absence of sponginess and smooth, well shaped root are important for the first group, while for the latter, rapid growth, form, colour and absence of bitterness are characteristics that may be improved.

Onions

Though strains of varieties of *Braunschweiger*, *Zittauer Gul* (*Zittauer Yellow*) and a strain of *Holländsk Silver Vit Syltlök* (*Dutch Silver White Pickling*) have been approved, seed production has been rather a failure in Sweden. Varieties that mature their seed early and are resistant to *Peronospora* are needed for successful seed production in Sweden. Official experiments are in progress with crosses between Swedish strains of potato onion and the best *Yellow Zittauer* strains.

Leeks

Swedish breeding operations have not yet led to any tangible result.

White Cabbage

Varieties of Dutch and Danish origin, e.g. *Ditmarsker* and *Amager*, abound. Specially selected varieties are needed for the short growing period of the northern districts. A combination of *Savoy* quality with the better yield and keeping properties of the white cabbage is another objective for the breeder.

Cabbage

Strains of green cabbage are defective in hardiness though some new ones put on the market are better in this respect. Red cabbage is not bred in Sweden. Danish varieties are used.

Cauliflower

Three approved varieties are now represented: Erfurter Dvärg (Erfurt dwarf), Stor Dansk (Large Danish) and Stor Svensk (Large Swedish), the last two being difficult to distinguish from each other. Their origins are given.

Cauliflower strains differ considerably and 12 have been approved as first class.

Brussels sprouts

Breeding has been in progress since 1930 at Alnarp and several promising varieties are undergoing tests.

Spinach

Growing has reached a high level in the varieties Kungen av Danmark (King of Denmark), Nobel and Viking. Winter hardiness and absence of the tendency to run to seed especially in northern latitudes are among the breeder's aims.

Lettuce

Breeding of lettuce is conducted by various firms and some new Swedish varieties have been produced though foreign varieties still predominate. Types for forcing are required that can be grown out of season and form a firm head without bolting, while for cultivation in the open early types that do not bolt too rapidly and are resistant to bacteriosis are needed.

Celery

Many varieties have been approved but all are susceptible to leaf spot disease. A new resistant variety called Balder has been produced in Denmark. Varietal differences have been noted as regards tolerance of lack of boron and resultant heart rot, suggesting that less sensitive varieties could be obtained by careful selection.

Melon

Really outstanding varieties are lacking. A combination of yield and quality is required.

Tomatoes

One Swedish variety Scania has recently been produced by Weibull's but it has not yet been officially tested. Earliness combined with well shaped fruits of good keeping quality are the chief requirements. The Swedish Landora tomato is a first-class product but rather late. Breeding and selection work is in progress at Alnarp.

Cucumber

Varieties of the forcing type include the Swedish Presens and Favorit which is a great advance among the white kinds and has large fruits and very small seed cavity. A new variety approved as first class in 1942 is Superb. Two approved early varieties are Muromsche and Spångbergs Vit (Spångberg White).

Beans

Many new varieties of snap bean differing in earliness and suitability for various latitudes have been produced, e.g. Arla, Olsok, Frikeby and Rekord. The old non-stringless, green wax podded beans have also been replaced to a great extent by snap forms of better quality.

Much still remains to be done as regards quality, for many of the varieties most reliable in yield are not the best in quality and those that are of high quality have often defects that need to be eliminated by suitable crosses, etc.

The requirements as regards brown beans (*Vicia Faba*) are better combinations of earliness, yield, quality and resistance to diseases and, if possible, in some degree to frost.

Efforts are being made to breed broad beans combining absence of bitter substance and (1) short plants with satisfactory yield and (2) tall habit.

Peas

In addition to valuable pure line selection from old varieties new types have been produced by hybridization. The old shelling peas have on the whole become superfluous since outstanding marrowfat types differing in earliness and height have been raised.

Requirements still to be met by the breeder are the canning pea with small seeds of uniform size that do not burst on cooking; earliness and high quality, which it is hoped may be obtained by crossing; and resistance to diseases and to unfavourable conditions for germination.

As regards the cross-pollinated vegetables, seed raising for many generations combined with strict standards of selection of strains for seed has resulted in the numerous foreign varieties

having become adapted to Swedish conditions. Hybridization to produce new varieties is, however, becoming more necessary as direct selection is by now almost exhausted as a means of improving the older varieties.

957.

635:575(73)

Breeding better vegetables for the South at the U.S. Regional Vegetable Breeding Laboratory.

Misc. Publ. U.S. Dep. Agric. 1945 : No. 578 : Pp. 34.

An account is given of breeding work at the Regional Vegetable Breeding Laboratory, South Carolina, for improvements in resistance to diseases and pests, in vitamin content, and in other characters in the following crops: cabbage, carrots, asparagus, water-melon, tomatoes, peas, snap and lima beans, and sweet corn. The investigations also include tests of the suitability of breeding lines and varieties for freezing and dehydration.

958.

WEIDHAAS, H.

635:581.6:578.08

Experimentelle Studien an Gemüse über die Entnahme von Durchschnittsproben zur chemischen Qualitätsbestimmung unter Anwendung statistischer Methoden. (**Experimental studies made with vegetables on the taking of average samples for chemical quality determinations, using statistical methods**).

Bodenkde u. Pflanzenernährg 1941 (1942) : 30 : p. 1.

[From Züchter 1943 : 15 : p. 165].

The importance of the problem led the author to conduct the experiments here reported on parsnips, celery, white cabbage, cucumbers, tomatoes and spinach. New ways of determining quality are indicated.

959.

BOSWELL, V. R.

635-2-1.521.6

Disease-resistant and hardy varieties of vegetables.

Nat. Hort. Mag. 1945 : 24 : 268-73.

Short accounts are given of disease-resistant and hardy varieties of tomato, peppers and egg plant.

960.

HASKELL, R. J. and

BOSWELL, V. R.

635-2-1.521.6(73)

Disease-resistant varieties of vegetables for the home garden.

Leaflet. U.S. Dep. Agric. 1940 (Revised 1943) : No. 203 : Pp. 8.

Notes are given on the varieties of 15 kinds of vegetables resistant to the most common diseases.

961.

TROFIMEC, N. H.

635.25/6:581.162:581.162.5

635.25/6:575.127.2

(The biology of flowering and fertilization in *Allium*).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record) 1940 : No. 5 : 76-86.

The structure of the inflorescence and florets, their variations and the biology of flowering are described with reference to various species, e.g. *A. Cēpa*, *A. Porrum*, and *A. fistulosum*.

Protandry prevails in *Allium* and the florets are clearly cross-pollinating even to the extent of interspecific hybridization, which is however relatively rare.

The amount of insect pollination was studied with regard to different species; the bee appeared to be the most important pollinator.

In tests of various types of isolators *A. Cēpa* ranked first in fertility, *A. fistulosum* and *A. Schoenoprasum* being second and third. The last named can be readily multiplied vegetatively but is not sterile as some authors hold. The different subspecies of *A. Cēpa* reacted differently to different ways of bagging.

Seed production is affected by the position of the inflorescence in the isolator. Shaking the inflorescence also increased the set.

Inbreeding proved injurious but selfing is permissible in breeding provided it is followed by hybridization.

Comparative germination and sterility studies were made with the different species. The percentage of sterile pollen in *A. Cēpa* was 8 and in *A. nutans* 1.97. Receptivity and the best time for emasculation were investigated.

A. fistulosum is more resistant to diseases, pests and frost than *A. Ceba* and the two were therefore crossed. It and the cross *A. Ceba* x *A. Porrum* are stated to have been successful. The formation of aerial bulbs is also recorded.

962. MANN, L. K. and
HOYLE, B. J. 635.25:581.6:578.08
Use of the refractometer for selecting onion bulbs high in dry matter for breeding.

Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 285-92.

The dry matter content of onions is important in varieties used for dehydration. A method of sampling the bulbs of breeding stock with little injury is described. The refractometer reading of the juice of the two outer fleshy scales is obtained. The percentage dry weight of the outer scales and this refractometer reading are satisfactorily correlated with the percentage dry weight of the whole bulb. A regression curve of the percentage dry weight of the whole bulb on the refractometer readings for five varieties is presented, which is considered to be representative of most varieties.

In the samples analysed, varieties with relatively low percentage dry weight of the whole bulb had a large average bulb size. Further observation is, however, necessary on this point.

963. SZE, L. C. 635.26:576.312.315
On the nucleolus in the pollen grain divisions of "*Allium fistulosum*"*.
Acta Brevia Sinensia 1944 : No. 8 : 15-16. (Mimeographed).

The behaviour of the nucleolus which is always attached to the satellite of a subterminal chromosome among the haploid chromosome complement of eight in *Allium fistulosum* has been investigated during microsporogenesis.

964. GEITLER, L. 635.26:576.312.35
Natürliches diploides *Allium carinatum*. (A natural diploid *A. carinatum*).
Ber. dtsh. bot. Ges. 1944 : 61 : 210-11.

A diploid plant of *A. carinatum* has been found near Linz. Its morphological and cytological characteristics are compared to those of the triploid form of this species described by Levan.

965. LIU, T. T. 635.26:576.354.4:576.353
Cytological studies of "*Allium odorum*".
Acta Brevia Sinensia 1944 : No. 8 : p. 15. (Mimeographed).

Meiotic and mitotic cell divisions in *Allium odorum*, an autotetraploid species with a somatic chromosome number of 32, are discussed.

966. TROFIMEC, N. H. 635.26:581.162.4:575.12
(Selective fertilization in *Allium fistulosum*).
Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
1941 : No. 1 : 31-34.

At the Maikop experiment station 19 varieties of *A. fistulosum* were allowed to pollinate freely. The seed was sown and the plants so produced, though they showed no signs of segregation, proved superior to the controls in yield of leaf and seed. The increase of seed yield was as much as 800% in one variety and 380% in another. The distance required for spatial isolation should be reduced, it is thought to 100-200 m.

967. RANDALL, T. E. and
RICK, C. M. 635.31:581.481
A cytogenetic study of polyembryony in *Asparagus officinalis* L.
Amer. J. Bot. 1945 : 32 : 560-69.

Diembryonic and polyembryonic seedlings of *A. officinalis* have been reared. The components have been either diploid, triploid, trisomic, haploid or tetraploid, in that order of frequency. Many of the multiple seedlings were morphologically attached to each other and are presumed to have arisen by incomplete embryonic fission.

*Referred to as *A. fistulosum* through an orthographica lerror.

968. VASILJEV, V. L. 635.34:575:631.531.12:575.3(47)
635.35:575:631.531.12:575.3(47)
(Choosing winter varieties of white cabbage and cauliflower for the regions of the far North.)
Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
1940 : No. 3 : 67-76.

Variety trials are recorded showing how important it is that each region in the extreme north of the U.S.S.R. should raise its own seed supply and thereby increase the yield for the different varieties in the various zones. This is proved by the performance of varieties from seed produced by the Polar Station of the Institute of Plant Industry at Hibiny.

Nomer Pervyi (No. 1) gave the highest yield of the early white cabbages and in spite of the short vegetation period, ripened fully. Under exceptionally favourable conditions (1938) the medium early Valjvatjevskaja and Slava (Fame) varieties also did well in trials.

Among the cauliflowers Snežnyi Šar (Snow Ball) and Erfurt, tested for one year only, are worthy of mention.

969. DETJEN, L. R. and PHILLIPS, W. H. 635.34:581.143.26:581.48
Relative effects of superior vs. inferior seed-branch positions in cabbage on time of seedstalk initiation in the immediate progenies of inbred plants.
Bull. Del. Agric. Exp. Sta. 1943 : No. 245 (Tech. No. 30) : Pp. 21.

Definite association was found in inbred progenies between the average date of seed-stalk formation and the position of the branches on the main stem of seed plants. In general progenies from seeds produced on inferior branches lagged behind the progenies from seeds on superior branches in the initiation of their seed stalks. From the data obtained the differences in the time of seed stalk development do not appear to be due to nutritional factors; probably differences in hormone activity are operative. It is suggested that the results have important bearing upon the problem of bolting.

970. ISBELL, C. L. 635.34:581.165
Propagating cabbage by root cuttings.
Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 341-44.

A rapid method of propagating by root cuttings during any season is described, which is considered valuable as a means of increasing selected plants in a breeding programme.

971. RALEIGH, G. J. 635.52:575.12(74.7)
Lettuce varieties for New York undergoing improvement.
Fm Res. 1944 : 10 : No. 2 : 9, 15.

The lettuce varieties Imperial No. 44 and Imperial No. 456 are described. The latter, derived from Imperial No. 152 x Brittle Ice, is more resistant to tipburn than Imperial No. 44; it is susceptible to aster yellows.

972. MILLAN, R. 635.62:576.16(82)
Variaciones del zapallito amargo "*Cucurbita andreana*" y el origen de *Cucurbita maxima*. (Variations of the bitter gourd *C. andreana* and the origin of *C. maxima*).
Rev. Argent. Agron. 1945 : 12 : 86-93.

The bitter gourd is morphologically very similar to *C. maxima* and easily crosses with it. With *C. moschata* it can be crossed but whatever fruits may be formed never bear seeds.

The species *C. Andreana* is very variable and some of the characters in which variation has been observed are described and illustrated. These show such a close parallel with the variations known in *C. maxima* that *C. Andreana* is regarded as the wild progenitor of that species, which is thought to have originated much further south than Peru and Bolivia, the centres ascribed to it by the Russian School.

973. HWANG, TSUNG-CHEN. 635.624:581.143.26.035.1(51)
Photoperiodic responses of the growth and the blooming of pumpkin.
Acta Brevia Sinensia 1944 : No. 8 : p. 22. (Mimeographed).

Plants receiving full daylight grew longer stems and larger leaves than those treated with short

photoperiods. The development of staminate flowers was, however, inhibited by short photoperiodic treatment; development of the carpellate flowers was promoted by such treatment.

974. FILOV, A. 635.63:581.47:581.48:581.6
(The connexion between the morphological characters of cucumber fruits, and their economically valuable qualities).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1941 : No. 1 : 126-32.

Microscopic study of the skin, tubercles, hairs and markings of the cucumber fruit has suggested that some relationship exists between these characters and the adaptability of a variety to a given environment and the quality of the fruit when salted.

975. BREZHNEV, D. D. 635.64:575(47)
(The utilization of the world collection of tomatoes for breeding work).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1941 : No. 1 : 77-88.

The division of vegetable crops of the Institute of Plant Industry has a collection of 1800 specimens of tomatoes, which are being added to each year and comprise material from America, Western Europe, Afghanistan and Asia Minor and other countries. A botanical study of the plants and their economic characteristics has been made. The present article gives a condensed account of some of the results of the analyses of American and European varieties and their value for various regions of the U.S.S.R. with special reference to the species *Lycopersicon esculentum* Mill.

It is recommended that, in crossing to obtain heterosis, forms differing not in their morphological features, but in their biological characteristics and their adaptations, i.e. forms that have been grown for some years under different conditions, should be chosen.

976. BREZHNEV, D. D. 635.64:575.12:575.148
(Selective fertilization and urgent tasks of breeding and seed-growing).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1941 : No. 1 : 20-23.

Six plants of the tomato variety Lučšii iz Vseh [Best of All] were selected as mother plants and all flowers of the second inflorescence of each plant were emasculated. The first flower was pollinated with pollen from the same plant; the second flower with a mixture of pollen from two plants of the same variety; the third with a mixture of pollen from three plants; the fourth with a mixture of pollen from four plants; the fifth with a mixture of pollen from five plants; and the sixth with a mixture of pollen collected from five plants together with some further pollen collected from three plants growing under different, more favourable conditions.

The results, it is claimed, demonstrate both the value of intravarietal crossing and the existence of selective fertilization, since the highest yields were obtained when the greatest range of pollen was available for effecting fertilization.

It is also argued that the present regulations regarding spatial isolation for seed production in vegetable crops (2 km. for such plants as onion and beet) lead to a deterioration in the quality of the crop rather than an improvement.

977. SHILOVA, S. N. 635.64:575.12:575.148
 635.64:575.125
(Intravarietal hybridization in tomatoes).
 Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
 1941 : No. 1 : 24-30.

Some two to five flowers on the second inflorescence of a number of tomato plants were emasculated and pollinated with a pollen mixture from other plants of the same variety. The seeds were washed out from the fruits produced and were planted together with controls consisting of seeds from fruits formed from the second inflorescence by free pollination; others formed from artificial self pollination were planted for comparison.

The plants from the cross pollinated seed were more sturdy and those from inbred seed less sturdy than the controls. There was no difference in the three series as regards vegetation period. The plants from intravarietal crossing gave a higher yield of fruit in 17 out of 20 crosses, the remaining three being equal to the controls. The highest increase was produced in the variety Lučšii iz Vseh [Best of All] with 38%, and Erste Ernte [First Crop] gave an increase of 35%. In

16 of the inbred plants on the other hand the yield was reduced, by 30% in variety No. 38/3 Neo Grope or Cluster Napol; the reductions were less in the other varieties, and Pritchard and Fürst Borghese [Prince Borghese] showed no fall in yield. The fruits from the inbred plants as a rule were smaller but more uniform.

Five of the varieties giving high yield increases in the first generation were chosen, and comparative sowings were made of first, second and third generation seed from intravarietal crossing together with controls of seed from free pollination of the parent plant; the second and third generations were less vigorous than the first generation but more so than the controls. The difference was specially noticeable on well manured plots. The yield, size and commercial quality of the fruits was best in the first generation from intravarietal crosses. The difference was most noticeable in the varieties Čudo Rynka [Market Wonder], where the excess in yield amounted to 50% on manured and 33% on unmanured ground; Rannií Rynočnyí [Early Market], where the differences were respectively 32% and 22%; Danish Export, with 21.9% and 12%; Erste Ernte, with 37.4% and 21% and Best of All with 41.7% and nil respectively. In all these qualities the second and third generations were better than the control, though the differences were less than in the first generation.

978. LARSON, R. E. and

CURRENCE, T. M.

635.64:575.125(73)

The extent of hybrid vigor in F_1 and F_2 generations of tomato crosses.

Tech. Bull. Minn. Agric. Exp. Sta. 1944 : No. 164 : Pp. 32.

Studies have been made during the period 1939-41 to determine the early and total yields and the fruit size of F_1 hybrids. In 1941 similar studies were also made on the F_2 generation. The parents were commercial varieties and several unnamed strains developed at the Minnesota Agricultural Experiment Station.

Early yield showed intermediate inheritance in the F_1 , with a tendency towards the parent giving the higher early yield. The increase of the F_1 in early yield over the parental average was 47%, that of the F_2 early yield 8%. The early yield of the F_2 hybrid 10-38 x 6-38 was, however, significantly greater than that of the F_1 .

The average increase of the F_1 total yield over the parental average was 39%, that of the F_2 total yield 23%. Nine hybrids gave significantly higher F_1 yields than both parents, but none of the strains were consistently superior as parents. The majority of the F_2 generations produced yields approximately midway between the parental average and the F_1 yields, but certain F_2 hybrids produced yields equal to those of the F_1 .

Inheritance of fruit size was found to be intermediate in the F_1 , with a tendency towards the size of the smaller-fruited parent. F_2 segregates with significantly larger fruit size than that of the parental average were obtained from the cross 3-38 x 6-38.

An investigation was made of the effect of different spacings upon the early and total yields and the fruit size of the hybrids. Early yields at a plant spacing of two feet were significantly greater in comparison with yields obtained at spacings of three, four and six feet; significant variations being found among hybrids in their response to the different spacings. Hybrids giving high total yields appear to do so at any spacing, indicating that plant size is not the only factor affecting total yield. Average fruit size increased as spacing increased from two to six feet, but the differences were not significant at the spacings of four and six feet.

A discussion is given of the problem of the practical utilization of heterosis in the F_1 and F_2 .

979.

635.64:581.143.32:581.47

ZIELINSKI, Q.

633:581.143.32

Fasciation in horticultural plants with special reference to the tomato.

Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 263-68.

The occurrence of fasciation in various crops is discussed, with particular reference to the tomato. A preliminary study has been carried out on the tomato to determine: (1) the degree of fasciation occurring in commercial varieties as indicated by locule number, (2) whether or not commercial varieties segregate for this character, and (3) the effect of season upon fasciation. A range in mean locule number from two to 16 was exhibited by the 30 varieties studied. A marked trend towards lower locule number was observed in all varieties as the season advanced. The differences in mean locule number between months within a single variety and the intervarietal differences in the same character were found to be highly significant. No evidence was obtained of segregation for locule number.

980. OBA, G. I.,
RINER, M. E. and
SCOTT, D. H. 635.64:581.162.3:578.08:575.125
Experimental production of hybrid tomato seed.
Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 269-76.

A method of hand-pollination is described which has been found to produce an ounce of F_1 hybrid seed in 3-4 hours pollination work under field conditions. It was also found that hybrid seed can be produced successfully in the summer under glass when high temperatures are likely to occur. It is pointed out that since the number of seeds per fruit varies among different varieties the parent most prolific in seed production should be used as female. The authors consider that the extra cost of satisfactory hybrid seed would be a worth while expenditure in view of the increase in early yield shown by F_1 hybrids.

981. RICK, C. M. 635.64:581.162.51:581.4:575.125
Field identification of genetically male-sterile tomato plants for use in producing F_1 hybrid seed.
Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 277-83.

The identification in the field of the cytogenetic types of unfruitful forms previously reported (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 476) is described. A discussion is given of the possible use of the male sterile mutants in the commercial production of F_1 hybrid seed and in the mass production of hybrids for other purposes.

982. ŠIVRINA, A. N. 635.64:581.192:577.16:575
(Inheritance of chemical characters in tomatoes).
Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record)
1940 : No. 5 : 133-41.

The material for the author's experiments consisted of 16 F_1 hybrids of standard red varieties of tomatoes. The results are shown for eight combinations as typical of the sixteen.

In all eight combinations the vitamin C content was either higher than that of the parents or equal to that of the superior parent.

Chemical analyses of the F_1 and P_1 showed that the sugar content of the hybrids was approximately equal to the mean of the sugar content of the parents. In six cases out of 16 there was a marked increase in total acidity and in no case was there a reduction. In some instances the content of citric acid attained 90% of the total acidity and in most varieties the figure was 50-60%. The stage of maturity of the fruit affected the content of various acids present in the P_1 and F_1 .

The hybrids contained less carotene than the parents, and throughout the whole ripening period, more flavin.

Parents and hybrids differed in the time when the maximum content of various chemical constituents was attained.

Acetic acid was formed in some hybrids though the parent forms contained no traces of it. Tetraploid and diploid hybrid forms gave similar results as regards carotene and vitamin C and in general, although the diploid parents differed somewhat in chemical composition from the tetraploids. Segregation in the F_2 was the same in both groups of hybrids.

983. GUBA, E. F. 635.64-2.484:576.16:631.521.6:575.127.2
Bay State, a red forcing tomato bred for resistance to leaf mold.
Bull. Mass Agric. Exp. Sta. 1942 : No. 393 : Pp. 8.

An account is given of the breeding of Bay State, a new variety resistant to *Cladosporium* leaf mould, which has been developed from a cross between the resistant species *Lycopersicon pimpinellifolium* Mill. and the susceptible *L. esculentum* Mill. It is suitable for greenhouse forcing, and only under conditions of leaf mould infection does it show superiority in yield to Waltham Forcing.

In the 1941 season Bay State exhibited susceptibility to a new physiological race of *Cladosporium*. The attack of this form on Bay State is, however, considered to be less virulent than that of the usual form occurring on Waltham Forcing.

The reaction of varieties of *L. esculentum* and different *Lycopersicon* species to *Cladosporium* leaf mould is discussed, with reference to the results of several investigators.

984. BECKENBACH, J. R. 635.64-2.484-1.521.6:575(75.9)
635.64-2.6-1.521.6:575(75.9)
Florida AES to release new high yield tomatoes; limited seed samples available by next spring.

Sth. Seedsman 1945 : 8 : No. 12 : 18, 48.

Breeding work at the Florida Agricultural Experimental Station is discussed. The programme includes breeding for resistance to *Fusarium* wilt, *Cladosporium* leaf mould, *Alternaria* blight, and nematode attack, and it involves as parents *Lycopersicon hirsutum*, *L. pimpinellifolium* and *L. peruvianum*.

985. YOUNG, P. A. 635.64-2.484-1.521.6:575.12(76.4)
The Rainbow tomato.
Sth. Seedsman 1945 : 8 : No. 10 : 14, 52.

An account is given of promising new wilt immune hybrids developed at the Tomato Disease Laboratory, Jacksonville, Texas. The gene *I* for immunity to *Fusarium* wilt was derived from a selection of the red currant tomato. Hybrid T772 gives a large yield of early fruit similar in size to those of Stocksdale. Hybrid T870 is a large fruited strain. The recessive character of white flowers has been introduced into the hybrid T-935 as a means of identifying impurities in the production of pure seed. Hybrid T667 is a high yielding strain derived from a cross between Hybrid T414 and Rutgers. The elimination of "lemon-tipped" fruit has been necessary in this strain. A selection has been obtained in the seventh generation which is free from this undesirable character; its yield performances is to be tested. Wilt immune yellow tomatoes have been obtained from crosses between Pan-America and Tucker's yellow-fruited hybrid.

986. KIKUTA, K.,
HENDRIX, J. W. and
FRAZIER, W. A. 635.64-2.8-1.521.6:575.12(96.9)
Pearl Harbor. A tomato variety resistant to spotted wilt in Hawaii.
Circ. Hawaii Agric. Exp. Sta. 1945 : No. 24 : Pp. 4.

The new variety Pearl Harbor has been developed from a cross between Bounty and BC-10. The latter is a selection of a hybrid involving the Red Currant tomato, resistant to spotted wilt virus. Pearl Harbor possesses the spotted wilt resistance of BC-10, and even in the absence of the disease it has equalled or exceeded Bounty in yield. Its fruits are, however, smaller, and the variety is at present recommended only for growing in areas where the virus is important.

987. KNOWLES, D.,
GROTTODDEN, O. and
LONG, T. E. 635.65:581.6(78.4)
635.67:581.6(78.4)
Variety tests of vegetables for freezing preservation. The comparative suitability of varieties of green beans, lima beans, wax beans, sweet corn and peas for freezing preservation.
Bull. N. Dak. Agric. Exp. Sta. 1943 : No. 322 : Pp. 22.

Varietal tests of suitability for freezing purposes have been carried out on green beans, lima beans, wax beans, peas and sweet corn.

988. CHANG, S. C. and
TSU, M. K. 635.65-2.3:576.16(51)
(Nitrogen fixation among different strains of *Rhizobium leguminosarum*).
Kwangsi Agric. 1942 : 3 : 231-40.

Variation was found to exist among thirteen strains of *Rhizobium Leguminosarum* inoculated into *Vicia sativa* and *Pisum sativum* in respect of their ability to affect the host plants. L. P. B.

989. SZE, L. C. 635.651:576.312.34:576.354.4
Structural changes of the meiotic chromosomes of "*Vicia faba*".
Acta Brevia Sinensia 1944 : No. 8 : p. 14. (Mimeographed).

An investigation of the structural changes of the chromosomes in *Vicia Faba* during microsporogenesis is reported.

990. MAGRUDER, R. 635.653:581.481:575.12

Recent advances in the breeding and culture of lima beans.

Proc. Ohio Veg. Potato Gr's Ass. 1942 : 27 : 80-86.

Descriptions are given of the following varieties of Lima bean: Baby Fordhook, Early Baby Potato, Illinois Baby Potato, Maryland Thick Seeded, Dixie Butterpea, Green Seeded Henderson (= Thorogreen, = Clarks Early), Illinois Large Podded, Asgrow Fordhook and McCrea. It is stated that efforts are being made to transfer the green cotyledon character to all present-day varieties.

991. McILROY, G. G. 635.655(73)

Where to in cornbelt soybean production.

Soybean Digest 1944 : 4 : No. 11 : 29-30.

The value of the new soya bean varieties, Earlyana and Lincoln, is discussed.

992. SESSOUS, G. 635.655:575(43)

Stand und Ziel von Anbau und Züchtung der Soja. (The state and aim of soya bean cultivation and breeding).

Forschungsdienst 1943 : Shft 16 : p. 400.

[From Züchter 1943 : 15 : p. 165].

The aim in soya bean breeding in Germany is earliness combined with good yield, e.g. over 24 dz. per ha. Suitable methods of sowing are mentioned. If forms could be discovered that would germinate below 8° and then develop normally, the sowing time could be advanced. Resistance to lodging is another desirable character.

993. CARTTER, J. L. 635.655:575(73)

What is the U.S. Regional Soybean Laboratory doing ?

Soybean Digest 1944 : 4 : No. 11 : 22, 62.

An account is given of the testing and breeding work carried out by the U.S. Regional Soybean Laboratory, since its establishment in 1936, in co-operation with the various states.

994. HENSON, P. R. 635.655:575(73)

Southern soybean program of the U.S. Regional Soybean Laboratory.

Soybean Digest 1945 : 5 : No. 11 : 47, 60.

An account of the soya bean breeding programme in the southern states is given. Varietal testing, hybridization, breeding for required dates of maturity, and promising new varieties are described.

995. WILLIAMS, L. F. 635.655:575(73)

The breeding work of the U.S. Regional Soybean Laboratory.

Soybean Digest 1944 : 4 : No. 11 : 34, 64.

Soya bean breeding work conducted by the U.S. Regional Laboratory and the co-operating states is described, with reference to improved yield and chemical composition, resistance to lodging and improved yield and disease, and desirable dates of maturity.

996. CHAO, R. Y. and YU, S. L. 635.655:581.162

(Anthesis of soya bean).

New Agric. J. Fukien 1943 : 3 : 34-49.

The results of a study of the process of blooming and related problems in soya bean are fully presented. L. P. B.

997. WILLIAMS, L. F. 635.655:581.48:575.242:631.531.12(73)

Off-colored seeds in the Lincoln soybean.

Soybean Digest 1945 : 5 : No. 11 : 50, 61.

The normal sized black seeds occurring in the variety Lincoln arise as the result of a mutation from i^w to i . The causes of mottled seeds appear to be environmental. The need for the use of pedigreed seed is stressed.

998. WALLS, E. P. 635.655:581.6

Edible soybeans.

Food Packer 1944 : 25 : No. 11 : 47-49.

A short account is given of the history of soya bean cultivation in the U.S.A. Details follow on the table quality and canning quality of the vegetable-type varieties.

999. ALLINGTON, W. B. 635.655-2-1.521.6(73)
Soybean disease investigations at the U.S. Regional Soybean Laboratory.

Soybean Digest 1944 : 4 : No. 11 : 60, 65.

The work of surveying and varietal testing in connexion with several diseases was begun in 1943. The author suggests that the use of a large number of soya bean varieties exercises an effective measure of disease control, and criticizes the tendency to plant only a few varieties extensively.

1000. KURGATNIKOV, M. M. 635.656:581.6:581.192
(The properties of the starch of different varieties of pea).

Vestnik Socialističeskogo Rastenievodstva (Soviet Plant Industry Record) 1940 : No. 5 : 142-48.

In continuance of previous work, the author here attempts to show that the difference between the starches of round and wrinkled peas is related to the chemical structure of the starch grains.

1001. HABER, E. S. 635.67:575.12(73)
Dent, flint, flour and waxy maize for improvement of sweet corn in-breds.

Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 293-94.

As a result of investigations begun in 1935, the author concludes that valuable improvement of sweet corn can be obtained by crossing inbred lines with suitable inbred lines and varieties of field maize. The methods of back-crossing and selection are described, and the lines of various types of field maize that have been found useful are indicated.

1002. DEL VALLE, G. 635.67:581.6:575.12(72.91)
Tipos cubanos de maíz (maíz dulce). [Cuban maize types (sweet corn)].

Rev. Minist. Agric., Habana 1945 : 28 : 4-10.

A description is given of the sweet corn breeding programme of the Estación Experimental Agrónomica. The main objective has been to produce varieties adapted to tropical climate and resistant to ear worm (*Heliothis obsoleta* Fabr.), fungous and bacterial diseases. Two varieties have been produced: Pajimaca, derived from Habana PF (MS)4 and Purdue 39 and 51; and Gondeva, from Habana PF(MS)4 and Honey June. The former has a high sugar content while the latter has a slightly more tender pericarp but a lower sugar content.

1003. OVERCASH, J. P. 635.71:581.143.26.035.1(78.8)
Propagation and culture of garden sage in Tennessee.

Proc. Amer. Soc. Hort. Sci. 1945 : 46 : 345-49.

Various investigations on the production of *Salvia officinalis* are described. These include a study of the effect of the photoperiod upon flowering, in which it was found that blossoming is inhibited or retarded by a short day of 9 hours and is promoted or accelerated by a long day of 18 hours.

BOOK REVIEWS

CANNON, W. B. and

FIELD, R. M.

061.3

International relations in science: a review of their aims and methods in the past and in the future.

Chronica Botanica 1945 : 9 : 253-98.

This memorandum was prepared for the Division of Foreign Relations of the National Research Council of the United States. It reports and examines the results of circulating a questionnaire in 1944 to available officers, mostly in America, of the International Scientific Unions and International Scientific Congresses. The purpose of the questionnaire was to discover to what extent each international scientific organization had been active during the two previous years for purposes other than those concerned with the war, what future activities were proposed when world conditions permitted, thus obtaining some idea of the actual status of international co-operation among scientists; and also to sound opinion on the most effective method of organization of scientists on an international scale. Under the menace of the atomic bomb and the world food shortage, the need for co-operation among scientists has become as vital in peace as it was in war. With the stark alternatives of the use of science for the destruction or the betterment of mankind confronting civilization, closer international co-operation between scientists is being widely sought, and the relationship between the scientist and society is being anxiously scrutinized by both scientists and non-scientists. The memorandum makes an interesting contribution to the topical consideration of the problem of international co-operation among scientists, though its presentation is not as well arranged and clear as it might be. With few exceptions, the answers received to this Anglo-American questionnaire express the view that co-operation among scientists on an international basis is a prerequisite for the unity of nations. In the matter of organization, general opinion favoured the International Scientific Union as the most effective method, rather than international scientific congresses or international conferences organized by national private organizations. Certain conclusions and recommendations are put forward, and it is interesting to read this section in the light of recent events, notably the formation of U.N.E.S.C.O., and the international conference of scientists from seven nations, recently held in London, under the title "Science and the Welfare of mankind". The authors' viewpoint that the relationship between science and government merits close consideration is to be welcomed as realistic, since the use made of scientific discoveries is ultimately a political question.

KENDALL, M. G.

519.24

The advanced theory of statistics.

Charles Griffin and Co. Ltd., London 1943 : Vol. 1. 42s. Pp. xii + 457. 16 illus. 79 tables.

Plant breeders do not as a rule choose while on refresher courses to attend lectures on mathematical statistics; any who did so before the war had to be informed that there was no theoretical text-book which expounded the whole of the modern theory of the subject with the necessary vigour and completeness. For many who require a knowledge of the processes in their work, books on statistical methods, while giving them what they want, were not intellectually satisfying. It is an important event, therefore, in the development of the subject that one industrious worker has produced during the war a first volume of a comprehensive treatise, followed in 1945 by a revised second edition, and promises the early appearance of a second volume to complete the work.

The author is already known for his part in the revision of Yule's classic *Introduction to the Theory of Statistics*, issued in 1937 under joint authorship as the eleventh edition of that work, and also for his own contributions to the theory of statistics. The new work develops a systematic treatment along mathematical lines of the theory as it exists at present, and while a complete appraisal must await the appearance of the second volume, it may be said at once that the first volume, which is complete in itself up to the stage selected for a break between the two volumes, is a fully authoritative exposition which at once has taken an honoured place in the literature of a subject in which the present half century has seen such a remarkable development. Not the least of the author's successes has been the synthesis of the work of foreign mathematical statisticians with that published in English. The references are fairly numerous, but it is understood that a more complete bibliography will be issued with the second volume.

The ground covered is the standard field ranging from probability and the study of frequency distributions up to correlation (simple, partial, multiple and rank), and is varied only by the somewhat unusual deferment of a formal study of probability and likelihood until after the various standard distributions, and their properties, have been described. Although the field is standard, the treatment is new in that it is formally mathematical throughout. In particular there is a chapter on characterization functions, developing a powerful method not only for the alternative description of a frequency distribution but also for the evaluation of many exact sampling distributions, although these are not developed as fully as they might be, e.g. to the distribution of the second order moment about the sample mean, or to that of the joint second order moments for a two-variable distribution, including the distribution of the estimated covariance.

A valuable part of the book is the series of examples given together with the exercises with which the chapter closes. Many of these latter are extensions of theory quoted from papers, and are designed doubtless to stimulate a wider reading in this field. A number of corrections have been made in the revised edition, and while it would be too much to expect even now the volume to be completely free from errors, examination shows that it has been carefully compiled. J. W.

PÉREZ CALVET, R.,
ZULUETA, M. M. and
ANÓS, A.

519.24

Experimentación agrícola. Fundamentos estadísticos y métodos operatorios.
(**Agricultural experimentation. Statistical principles and methods of operation**).

Instituto Nacional de Investigaciones Agronómicas, Madrid 1943 : Pp. vii + 272. 19 figs. tables.

In this publication of the Economic, Statistical and Applied Mathematical Section of the National Institute for Agronomic Investigations, the authors have prepared a treatise on what can best be described as the principles and practice of field experimentation. Since the emphasis has been laid on the principles, and since these cover the application of statistical methods to the problem, the value of the book lies in its exposition to the Spanish-speaking world of the modern theory of statistics so far as required to understand and apply the standard field experimental methods developed in England.

The first part develops the theoretical statistics, and is somewhat mathematical considering the class of reader. The tendency is for the earlier treatment, i.e. what can be summed up in the term "large sample theory", to follow the standard procedures of mathematical text books on the theory of observations giving proofs; but for the rest to be an exposition, without proofs where these would be too formidable, of R. A. Fisher's very substantial contributions to the modern theory. In the second part the application of the methods to the field trial is taken up. Questions of lay-out are considered, and the method of analysis of variance is expounded as far as factorial arrangements, various examples of the calculation being given. The book ends with the use of covariance and with a description of other methods of arrangement of a systematic character. The necessary tables for use in testing significance are incorporated in the book. J. W.

FORD, L. R.

519.24

Alignment charts.

Notre Dame Mathematical Lectures, Indiana 1944 : No. 4 : 1-29.

COPELAND, A. H.

The teaching of the calculus of probability.

Ibid 1944 : No. 4 : 31-43.

MENGER, K.

On the relation between calculus of probability.

Ibid 1944 : No. 4 : 44-53.

ARTIN, E.

On the theory of complex functions.

Ibid 1944 : No. 4 : 55-70.

The lecture by L. R. Ford on alignment charts or nomographs outlines the mathematical principles which govern the construction of this useful graphical method of computation, which includes as its more well-known example the common slide-rule. Application of these principles

includes transformation of the scales to bring them within the size of a given rectangular page, and breaking the scales into several portions to achieve greater accuracy for a given size of chart. The reader, from these and other practical hints, should be in a position to construct his own nomograph for any particular formula.

The article by A. H. Copeland, with an editorial note "On the relation between calculus of probability and statistics", is an exposition of fundamental concepts in the theory of probability, e.g. probability, independence, distribution and moment-generating functions. It should be noted, however, that the author adopts the explicit definition of probability in terms of an infinite sequence (cf. for example the introduction to Wald's lecture "On the Principles of Statistical Inference" reviewed in *Plant Breeding Abstracts*, Vol. XIII, p. 376), and that objections to this point of view have been made. The reviewer did not find his difficulties clarified by the long editorial note which follows, in particular disagreeing with such a statement as "a purely statistical theory would not transcend the domain of the observable".

The final article "On the theory of complex functions" is by Emil Artin.

M. S. B.

JACK, H. A.

57

Biological field stations of the world.

Chronica Botanica 1945 : 9 : Pp. 73.

Although the biological field station appeared some 80 years ago, first as the seaside laboratory and aquarium or summer school for marine natural history, and has continued to have an important function in the present century, the literature written about it has been comparatively scanty. In this bulletin the scattered and unpublished information on the biological field stations of the world has been collected, supplemented by a first-hand study by the author of a number of these stations. Sections are devoted to the history and purposes of biological field stations; their location, administration, equipment, living facilities, the instruction offered, and their research activities. A list of references is appended to each section. Vital problems on organization are analysed in the course of the account, such as the relationship between instruction and research work. The remainder of the study consists of a directory of the stations, arranged under countries, and with notes up-to-date in 1940. The volume provides a useful source of varied information; it should play a part in ensuring that field biological stations maintain their adaptability and contribute as much to biology in instruction and research in the future as they have done in the past.

ALTENBURG, E.

575.1

Genetics.

Henry Holt and Co., New York 1945 : \$3.20. Pp. xii + 452. 148 figs.

This is a sound and useful general text-book of genetics covering the whole field of Mendelism, the necessary cytological background (including a study of the familiar types of abnormal behaviour), and modern practical developments such as induced mutation and polyploidy. The book is adequately illustrated. Each chapter ends with a summary and a list of exercises.

While the book would form very useful additional reading for the student of plant genetics, it is doubtful whether it would form the most suitable main text. The principal types of behaviour all seem to be dealt with, and breeding methods and such subjects as evolution and population genetics briefly discussed, but the book seems much richer in examples taken from animal genetics (particularly *Drosophila*) and one feels that one would often like more thorough treatment of the plant side.

An important defect in the reviewer's opinion is the absence of references to literature and of a bibliography.

Errors appear to be few; one is the statement that the whole of the pea and bean family habitually self-pollinate.

S. E.

MARSH, F. L.

576.12

Evolution, creation and science.

Review and Herald Publishing Association, Washington, D.C. 1944. Pp. 304.

There is abundant evidence today that the human mind is constantly prone to seek for authoritative teaching in every realm of knowledge. The cherished illusion that scientific progress has emancipated men from such a bondage has never been more clearly exposed than now, and cannot but induce reflexion in those concerned with scientific research and teaching. Religious dogmas, political dictates, philosophical systems from Aristotelianism to dialectical materialism, and even

scientific theories, have all in their time claimed obedience from scientific workers, and the word "orthodoxy" in just as much current to-day in genetical literature as it once was in theological controversy.

Judging from the attractively written book under review, biblical fundamentalism with its insistence that biology be subject to a literal interpretation of the book of Genesis is still flourishing and possibly expanding in the United States. The author's aim is to defend the theory that "about six thousand years ago, on the third, fifth, and sixth days of a literal week, creation week, the Creator, by His divine power, made to appear upon this earth, a richly diversified flora and fauna consisting in many instances of individuals just as complex in structure as any of our present-day forms." To support this theory appeal is made not only to the book of Genesis, but also to the genetical and cytological treatises of such authors as Dobzhansky, Goldschmidt, Mayr and Darlington. The author shows himself to be quite well acquainted with modern genetical literature, and has himself contributed articles on entomology to standard American journals. Although rejecting any universal evolutionary theory, Professor Marsh admits, against extreme creationists, micro-evolution within the distinct types believed to have been specially created. The number of specially created animals is calculated from an estimate of the length of Adam's spare time on Friday, for "the account is that Adam named all dry-land animals on Friday, had time to feel lonesome, then was caused to fall asleep, and was afterwards presented with Eve; and then this first human pair logically had time to get somewhat acquainted before sundown Friday evening". This calculation is checked by estimating the accommodation available in Noah's ark. Geneticists and plant breeders will naturally wonder how acquaintance with genetical literature could possibly result in such conclusions. But psychologically the matter is comparatively simple. Authoritative teaching need not be rational in order to claim allegiance. Professor Marsh is fairly consistent in his deductions from Genesis, but nowhere gives his reasons for supposing Genesis to be infallible, nor for the assumption that Genesis is meant to be understood literally. He criticizes the symbolic interpretations put upon this book by St Augustine, but does not stop to consider whether such an interpretation is far more in line with common sense than his own. Furthermore, he ignores the literal inconsistencies between the J, E and P narratives of Genesis, which alone indicate the futility of using this text for the establishment of biological minutiae.

If the book under review merely represented a relic of a disappearing mode of thought, it would call for little comment. But it is because it exposes the underlying irrationality of much modern scientific thought that it deserves mention. Argument by authority appears unreasonable to everyone, except in respect of his own authorities. Much scientific work is being done under the unconscious spell of theories that have become authoritative for their investigators. Professor Marsh's volume reveals the consequences of arguing from a particular unpopular authority; authorities popular amongst geneticists and plant breeders are no more infallible.

DARLINGTON, C. D. and

JANAKI AMMAL, E. K.

576.312.35

Chromosome atlas of cultivated plants.

George Allen and Unwin, Ltd., London 1945: 12s. 6d. Pp. 397. 3 tables.

No adequate study of plant relationships can be pursued today without a knowledge of the cytology of the plants concerned. Both in theoretical studies and in practical breeding work, due attention must be paid to the nuclear constitution of the material under investigation, since this is likely to affect the development and breeding behaviour of plants more than most other and more conspicuous characteristics.

Up to the present, the only comprehensive lists of chromosome numbers were those drawn up by Gaiser and Tischler. The volume under review is a most welcome addition to these works and will provide for English-speaking readers a panoramic view of the chromosome constitution of flowering plants. Although the title suggests that cultivated plants alone are treated, this is hardly the case, for the large majority of plants whose chromosome numbers have been counted are included.

The plants are arranged under their families, the order and classification adopted being a modification of that devised by Hutchinson. The presumed basic chromosome number of each genus is given when the evidence permits conjecture, and then the individual chromosome numbers follow for each investigated species. Popular names are given for many of the species, these not always free from the artificiality practised by compilers of floras; the abbreviations used are also apt to be

ambiguous. The authorities quoted are usually the most recent investigators. For each species, a brief indication is given of its economic use, which by an extension of meaning covers such diverse activities as parasitism, the awaking of curiosity and religious edification, and also of its geographical distribution.

An introductory essay by Dr Darlington prefaces the catalogue and discusses its theoretical and practical value.

It is a pleasure to recommend this book to everyone concerned with the genetics, cytology, evolution or breeding of plants. There are, as could hardly have been avoided, a number of slips in the spelling of names, chromosome numbers, references and geographical distributions, but these fail to detract from the general utility of an opportune contribution to cytological literature.

DELOFFRE, G.

576.34:633.367

Recherches cytophysiologiques sur *Lupinus angustifolius*. (**Cyto-physiological researches on *L. angustifolius***).

A. Taffin-Lefort, Paris-Lille 1939: Pp. 137. 82 tables. 4 graphs.

Nuclei and nucleoli in the cells of isolated embryonic axes from seeds of *L. angustifolius* undergo a diminution in size when the axes are kept for a few days on distilled water; the higher the temperature, the more rapid is the diminution. If the distilled water is later replaced by glucose, the nuclei and nucleoli increase in size. This regeneration process has the three critical temperatures, minimum 2° C., optimum 28° C. and maximum 41° C. The varieties in size of the nucleoli are relatively greater than those of the nuclei.

A similar technique was used to investigate the formation of starch when glucose was added after starvation. The threshold concentration for starch formation was found to differ in different cells, being very low in stomatal cells and very high in medullary cells. From the different minimum temperatures for the disappearance and the development of starch grains, it is inferred that these two processes are catalysed by different enzymes.

Different sugars, glycerol and organic acids are capable of affecting nuclear and nucleolar diminution in different degrees, while others are without effect in this respect. The same applies to starch formation, but certain substances which can affect nuclear and nucleolar size cannot affect starch formation.

Cutting the embryonic axes led to an increase in nuclear and nucleolar size in the cell layers near the cut, provided that the reserves of sugar in the cells were adequate. This is interpreted as a physiological condition preceding cell division and resulting from the action of a wound hormone. Copper sulphate, mercuric chloride and cadmium chloride in very dilute solutions accelerated nuclear and nucleolar diminution by starvation and retarded regeneration in the presence of glucose. The sugars mannose and galactose, which are both assimilable, inhibit in certain relative concentrations the development of starch in the presence of glucose. Mannose and galactose also produce brownish lesions in the axes, an effect which can be neutralized by a large enough concentration of glucose.

J. L. F.

DANNE, H. A.

578.088

The life energy of species.

Engineering Laboratory, New York 1944: Pp. 27. 3 figs. Table. Charts.

The term "species" appears to be used by the author of this book in the sense of "kind" or "variety" and is applied not only to living organisms but also to such substances as cotton fibre and processed rubber. An apparatus is illustrated and described (very inadequately), with which the author claims to be able to obtain data for the drawing of a graph of "vital time-energy units", the shape of which is characteristic of the substance under test. The conclusions are sweeping and somewhat disturbing to taxonomists and physicists alike. They can best be illustrated by a few quotations: "Dynamics are the ultimate foundation of the being of Species and combined with Time are also the foundation of the Curves, Charts and Patterns shown here. Botanical identification by sex, color, shape and other superficial peculiarities is therefore superseded". Vital time-energy units are referred to as follows: "Life and existence are automatic functions of these Units. Other action of these Units is called Willpower, Initiative or Spirit.... This composite of the super developed energies of species is called by us the 'Soul, Spirit, Ego or I'.... They are the epitome of all being, even as You and I".

There are industrial applications too, chiefly relating to moisture determination. A final quotation reveals that "It has been proved by plotted cumulative charts.... that distilled water is crude Dihydrol.... i.e. water with dissolved ice and steam".

The fact that this book is published by the author himself is presumably significant. S. E.

GENTRY, H. S. 582(72)
Rio Mayo plants. A study of the flora and vegetation of the valley of the Rio Mayo, Sonora.
 Carnegie Institution of Washington, Washington, D.C. 1942 : Publ. 527.
 Pp. vii + 328. 29 pls.

The flora of Mexico is one of the most interesting in the whole of the American continent. It has been studied now for many years but is still inadequately known in many respects. Any contribution therefore to Mexican floristics is most welcome, especially when of such high standard as the volume under review.

Mr Gentry has spent several years collecting plants in the Mayo drainage basin in the states of Sonora and Chihuahua, a little-known region comprising a coastal plain flanking the western Mexican cordillera with the dissected barranca region between. Ecologically, this area is characterized by four principal associations, a xeromorphic thorn forest along the coastal zone, a mixed deciduous forest further inland, a forest dominated by oak species between elevations of 3000 and 5000 feet, and a pine forest in the higher parts of the sierra. The author's investigations have shown that many northern species extend further south in Mexico than previously known, and conversely many tropical species extend further north. Several new species are described, including five agaves, viz. *Agave bovicornuta*, *A. colorata*, *A. mayoensis*, *A. Shrevei* and *A. Wocomahi*. The greater part of the book contains a list of all the species known in the Mayo basin, including accounts of their distribution and ecology within the area. Spanish and Guarijio vernacular names of the plants are given when known, also notes on their economic value.

A guide to the whereabouts of the specimens collected by the author and a fine selection of photographs of typical plant formations conclude the volume.

BOUGHEY, A. S. 632(62.4)
A preliminary list of plant diseases in the Anglo-Egyptian Sudan.

Imperial Mycological Institute, Kew, 1946 : 3s. Mycol. Pap. No. 14 : Pp. 16.

A useful list of diseases of the economic plants of the Anglo-Egyptian Sudan has been compiled from the records of the Department of Agriculture and Forests and from various published works. The host plants are arranged alphabetically under their English names, and under each plant the diseases are similarly listed by their scientific names. In the index, hosts and parasites are arranged under their scientific names, and whenever possible the common Sudanese arabic names for the crops are included. Information is also given on the distribution of the diseases. It is interesting to note that many serious plant diseases have not yet appeared in the Sudan, for instance, club root of the Cruciferae, and wart disease, powdery scab and pink rot of potato. It is hoped to discuss the possible explanation of this in another paper.

BISBY, G. R. 632.4:582
An introduction to the taxonomy and nomenclature of fungi.

Imperial Mycological Institute, Kew 1945 : 5s. Pp. vii + 117.

Mycology enters into several sciences; the correct identification of the fungi is therefore highly important. In contrast to the main groups of the higher organisms the fungi offer a relatively unexplored field of taxonomic enquiry in which a very large number of species are not yet known; fundamental taxonomic investigation remains to be done in practically every family. With this state of affairs a sound basis upon which to approach taxonomic problems in the fungi, and a harmonious relationship between taxonomy and nomenclature, are essential.

The purpose of this volume is to provide the research worker and competent amateur collector with a guide to the methods of the taxonomy and nomenclature of the fungi. The book is divided into two main parts. The first part consists of ten chapters on the various aspects of taxonomical work, such as collecting, culturing, naming and describing, and preserving material. The second part discusses problems of nomenclature, and one chapter includes the International Rules of Botanical Nomenclature. The Articles and Recommendations of the Rules are given verbatim, and contain the additions and alterations passed at Amsterdam in 1935 and which remain on trial until the next Congress. It is worth noting that this source of reference of the Rules is more complete than the official Rules which do not include changes made in 1935. In order to relate the Rules to the particular problems of the classification of the fungi, the examples occurring in the Rules have been replaced by examples of names of fungi; various proposals

made in the literature since 1935 have also been added. The volume provides a source of reference which will be indispensable to workers on various mycological problems; it should do much to encourage clarity in the study of a difficult subject.

THOM, C. and
RAPER, K. B.

632.421.2:582

A manual of the *Aspergilli*.

Baillière Tindall and Cox, London 1945: Pp. ix + 373. 76 figs. 7 pls.

Recent research on *Neurospora* and *Saccharomyces* has indicated clearly how important a role the fungi have to play in the development of genetics. At the same time, biochemical research has brought to light the immense range in the synthetic capacities of this group, a discovery which has led to many important practical applications. Now this co-incidence of discoveries needs for its full practical development the services of the plant breeder—the term fungus breeder does not yet appear to have become current—so that fungal strains with a maximum yield of high quality products may be obtained. The basis moreover for any breeding programme is a wide range of breeding material, and for this reason any detailed taxonomic monograph on economically valuable forms is extremely useful.

It is hardly necessary to add that such a work connected with the name of Dr Thom will be a *sine qua non* for anyone concerned with fungus breeding. The monograph on *The Aspergilli* published by Thom and Church in 1926 has long been recognized as a standard work, and the volume under review, although claiming to be a manual only and disclaiming monographic status, is likely to achieve a similar distinction. It is stated that two purposes are intended for the manual; firstly, the enabling of research workers to identify *Aspergillus* strains, and secondly, the provision of a guide to the citations in the literature.

The first objective is met in Part II of the manual, in which detailed descriptions are given of the 77 species recognized, together with an account of their taxonomic relations, synonymy, distribution, industrial applications, antibiotic properties and pathogenicity. Keys are provided throughout. The second objective is provided for in Part III, in which about eighty pages are devoted to bibliographies and a valuable check list of species.

Geneticists will also be particularly interested in the General Discussion constituting Part I. It is very hard not to sympathize with the authors in their rejection of the genus *Eurotium* for the ascospore species of *Aspergillus* whatever the *International Rules of Botanical Nomenclature* state to the contrary. In general, an attempt is made to avoid excessive splitting, though even so it is remarked that "one can almost cite it as a rule that the definiteness with which one regards a species is inversely proportional to the number of strains of that species which have been examined". Both intraspecific and interspecific variation within the genus are so wide that it is not easy to abolish all qualms as to the applicability of the traditional taxonomic categories to the group. Perhaps eventually the cline concept and the notions of ecospecies and coenospecies may find a useful place in fungal taxonomy. A whole chapter in this part, devoted to natural and induced variation within the genus, is of particular interest, though it would be useful to have further information on anastomosis between strains, since heterocaryosis is proving highly significant in the neighbouring genus *Penicillium*.

In finally recommending this book it is only necessary to add that the copious illustrations are exceptionally good.

NEERGAARD, P.

632.484:582

Danish species of *Alternaria* and *Stemphylium*. Taxonomy, parasitism, economical significance.

Communication from the Phytopathological Laboratory of J.E. Ohlsens Enke, Copenhagen. Humphrey Millford, Oxford University Press, London 1945: Pp. 560. 158 figs. 48 + 67 tables.

This valuable and well-printed monograph, translated from the Danish by Dr Hans Andersen, covers in detail the synonymy, history, distribution, economic significance, morphology, physiology and pathogenicity of all the species of these two imperfect fungous genera known to occur in Denmark. The work is firmly based on the author's own observations and experimental studies, particularly on the morphological and pathogenic sides. The general section contains, *inter alia*, a short critical discussion on the International Rules of Botanical Nomenclature as they apply to the fungi, and key to the 23 species and varieties described. Lists of differential characters are also given where required throughout the special part which includes a full and

up-to-date account of potato early blight, the causal agent of which is renamed *Alternaria Porri* (Ell.) Neerg. f. sp. *Solani* (E. & M.).

A short concluding section covers the topics of epidemiology and control in these generally weakly parasitic organisms. W. R. S. W.

SMITH, K. M.

632.8(42)

Virus diseases of farm and garden crops.

Littlebury and Co. Ltd., Worcester [1945?] 10s. 6d. Pp. 111. 16 pls. 14 figs.

Primarily intended for the student and grower, this volume answers the long-existing need of a practical handbook on the plant viruses infecting the horticultural agricultural crops of the British Isles. With the increasing application of scientific methods to agricultural practice, the problems of virus control are becoming more and more the concern of the farmer and horticulturist, and are particularly pressing in view of the fact that in certain crops virus diseases are on the increase. A simply written but at the same time authoritative handbook designed to facilitate the field identification of the common viruses is therefore timely. Chapter I is devoted to a short account of the elementary methods of plant virus investigation. In Chapter II a description is given of the most important insect vectors and the experimental technique of insect transmission. The remainder of the book, comprising Chapter III to IX, describes the common viruses of the main types of crops, including the virus diseases of ornamental plants and a number of medicinal plants and weeds. When available, control measures are indicated in each case, including the utilization of varietal resistance. Most of the 16 photographic plates appear for the first time. The appendix consists of 14 excellent figures illustrating the diagnostic characters of the chief insect vectors. The book provides a valuable source of information for all enquirers on the practical aspects of the virus diseases.

GOUGH, H. C.

632.951.1

A review of the literature on soil insecticides.

Imperial Institute of Entomology, London 1945: 10s. Pp. ii + 161.

This critical review of the literature on soil insecticides, which was prepared at the request of the Agricultural Research Council of the United Kingdom, chiefly covers the period 1914-1940. In order to reduce the amount of material to be examined to manageable proportions, the scope of the review is limited to soil insecticides *in sensu stricto*. Thus, all reference to the Nematoda is omitted; the control of the Myriopods and Arachnids is however included. The main part of the work is alphabetically arranged under chemicals, and within chemicals under insects, one section being devoted to the most important chemicals and another to the less important substances tested. A section deals with general problems, such as methods of application and the experimental methods of assessing the toxicity of soil insecticides. In view of the scattered nature of much of the information on the subject this review is particularly valuable.

WHITEHEAD, T.,

633.491

McINTOSH, T. P. and

FINDLAY, W. M.

The potato in health and disease.

Oliver and Boyd, Edinburgh 1945: 2nd ed. revised: 25s. Pp. xv + 400. 19 tables. 31 figs.

For some time the workers on the potato have been in need of an up-to-date textbook bringing together all the miscellaneous information available in various journals and pamphlets. Existing textbooks were long out-dated, so that the appearance of the present book is more than welcome. Far from being merely a revised edition it is a completely new book, which, although it follows the first edition in outline in some sections, is quite new in others, and throughout has been re-written and examples brought up-to-date. Most of the original photographs have been retained, but many are grouped into plates allowing the inclusion of a further series of photographs and text drawings. Of the increase in size from 264 to 400 pages almost the whole is taken up by the increase in the section on diseases, which is nearly trebled, indicating the greater importance attached to potato diseases than when the first edition was published. This section includes a very useful key for the identification of diseased conditions, as well as an exceedingly good and up-to-date account of each disease. An omission would seem to be the chapter on animal and insect pests, and while collectively these are not numerous, at least one, the root eelworm, is a

serious pest in some districts and is worthy of mention. In view of the possibility of the introduction of the Colorado beetle into this country from the continent of Europe, it would seem to have been useful to retain the description and plate of this pest. The chapter on potato systematics has been rendered somewhat out-of-date by the publication by Hawkes¹ which appeared while this book was at the printers, but this should affect only a small proportion of readers. The section on description and classification of potato varieties has been simplified by reducing the number of foliage types from 13 to 7; photographs of the types are given, and excellent photographs of sprout characters are included. There is an excellent appendix giving descriptions of individual varieties and including the latest knowledge on the varietal reaction to virus diseases. The production is extremely good, but it is to be regretted that it has been found necessary to double the price. Nevertheless, in spite of the few criticisms offered, the book can be confidently recommended to all actively engaged on the potato crop as the most up-to-date and comprehensive textbook on this important subject.

C. M. D.

OSVALD, H.

633.5

Spånads- och oljeväxter. (**Fibre and oil crops**).Nordisk Rotogravyrs Handböcker för Jordbrukare, Stockholm 1944 : Pp. 259.
illus. pls. tables.

Based on lectures delivered in 1940-42 at the Swedish Agricultural College, this illustrated manual has been written to provide its readers with an up-to-date account of fibre and oil plants, including developments in Sweden up to 1943, and some additional information of a later date.

In Part I, after a short introduction on fibre crops and plant fibres, including observations on structure, occurrence in nature, and the economic requirements for different fibres, the author passes on to a consideration of flax, its origin, systematic position, morphology and biology, its geographical distribution and cultivation with special reference to Sweden, and the future of flax production and flax breeding, especially the work done at Svalöf. Incidentally, the autumn flax, the so-called Roman flax, grown in Austria, Carinthia and Northern Italy is stated to be insufficiently winter hardy for Sweden; *Linum perenne*, found in cultivation in Siberia, is mentioned for its reported great strength of fibre and its luxuriance (20-30 full-grown stems on one root).

The subsequent account of the various aspects of cultivation, lodging, diseases and pests, yield, quality and soil requirements, processing, including the technique of chemical decomposition of the fibre and cottonization, is presented in a lucid and interesting fashion.

The section on hemp, though shorter, follows the same plan and includes information specially relating to the history and development of hemp cultivation in Sweden, where an area of at least 4000 ha. would be required to meet home requirements.

The remaining four chapters are devoted to *Urtica dioica*, *Asclepias incarnata*, *Yucca filamentosa*, *Humulus Lupulus*, *Boehmeria nivea*, *Apocynum cannabinum*, *Salix viminalis*, *Dipsacus sativus* and a few plants, which, though possessing hairy seeds, have so far proved valueless for textile purposes.

The book is well written and contains many interesting facts difficult to obtain elsewhere and indicative of a wide and expert knowledge of the subject, e.g. the identification of the dinga fibre (*Asclepias incarnata* L.) grown in Sweden, Finland and Germany.

There is appended a list of relevant literature classified by subjects, annotated lists of quality grades for Swedish flax and hemp, and an alphabetical subject index to the whole volume.

All educational institutes and agricultural or industrial research bodies, concerned with textile production or with plant breeding and genetics, could profit by securing a copy of this book for the foreign sections of their libraries. In view of the excellence of this and the author's previous manual on the potato, it is to be expected that Part II of the present volume on oil crops will be of an equally high standard.

ROSSI, U.

633.71(45)

I tabacchi greggi Italiani. (**Italian common tobaccos**).Ente Nazionale per il Tabacco, Roma Istituto Grafico Vanzetti e Vanoletti,
Milano 1937-XV : Pp. 128. coloured plates.

The history of tobacco cultivation in Italy is briefly traced in an introductory article by Ing.

¹Hawkes, J. G. Potato collecting expeditions in Mexico and South America. II. Systematic classification of the collections. Imperial Bureau of Plant Breeding and Genetics, Cambridge, 1944. Pp. 1942.

Rosselli, after which the varieties, divided into four sections, *Tabacum*, *Rustica*, *Petunioides*, and *Polidichia* are described and illustrated. Each variety has a coloured plate of the whole plant as well as a coloured plate of a dried leaf and in most cases a bundle of the dried leaves. R. M. I.

FARDY, A.

633.71:575.127.2:576.356:576.312.35

Etude cytologique et génétique du croisement interspécifique *Nicotiana Tabacum* L. (var. *purpurea*) x *N. sylvestris* Speg. et Comes et de sa descendance. [Cytological and genetical study of the interspecific cross *N. Tabacum* L. (var. *purpurea*) x *N. sylvestris* Speg. et Comes and of its progeny].

E. Drouillard, Bordeaux 1941: Pp. 108. 24 figs. 7 pls. tables.

In the F_1 hybrid there appears to be complete pairing between the 12 chromosomes of *N. sylvestris* and a set of 12 from *N. Tabacum*. Secondary associations of univalents with each other and with bivalents suggest a basic number 6 for the genus *Nicotiana*. Gametes appear to be produced with chromosome numbers of about 23 (*Tabacum* type) and of about 12 (*sylvestris* type); these two types would account for the seed fertility observed. In the F_2 there are obtained: (1) types resembling *N. Tabacum*, which are relatively fertile and have a high number of bivalents at first metaphase of meiosis; they result from the fusion of *Tabacum*-type gametes; (2) very fertile types resembling *N. sylvestris*, resulting from fusion of *sylvestris*-type gametes; (3) more or less intermediate types with low fertility; they arise by fusion of *Tabacum*-type gametes but are unbalanced in their chromosome complement; (4) and aberrant and completely sterile types with about 40 chromosomes.

In the F_3 , types are found with $2n = 24$ and with $2n = 48$ chromosomes. The $2n = 24$ types closely resemble *N. sylvestris* but the $2n = 48$ types are more intermediate and their meiotic behaviour shows much evidence of heterozygosity. In later generations lines can be established with $2n = 48$ and a more or less uniform phenotype; such cytological irregularities as remain can be reduced by selection of parents for meiotic regularities.

Certain of the relatively stable $2n = 48$ lines thus established resemble existing subspecies of *N. Tabacum*, viz. subspp. *virginiana* and *brasiliensis*, suggesting that *N. sylvestris* has played a part, by hybridization with *N. Tabacum* var. *purpurea*, in the origin of cultivated forms of tobacco. Other lines have entirely new characters.

J. L. F.

RICHENS, R. H.

634.9:575

Forest tree breeding and genetics.

Imperial Bureau of Plant Breeding and Genetics, Cambridge; Imperial Forestry Bureau, Oxford 1945: 5s. Pp. 79.

During the last ten or fifteen years considerable progress has been made in genetical studies with forest trees, with a view to improving the existing stock through selection, breeding and related techniques. At present there is no publication bringing together all the information which already exists in this important field, and it is becoming increasingly difficult for research workers to keep abreast of all modern developments. In addition, many of the more important papers have appeared in comparatively inaccessible German, Russian and Swedish forestry journals, and have not been readily available to those interested in forest tree breeding in the Empire.

This bulletin collates the more important papers on this subject that have appeared since 1930. General principles of tree breeding are described in an introductory section with a brief account of the basic theoretical concepts. The methods so far used include line breeding, the development of hybrids exhibiting heterosis, and the utilization of polyploids.

The selection criteria that have been used by tree breeders include timber yield, photoperiodic adaptation, high reproductive capacity, tree shape, wood quality, competitive ability, and resistance to bacteria, fungi, insects, viruses, low temperature and other unfavourable environmental conditions. These characters are considered in general and with special reference to the tree genera treated in the bulletin, viz. *Abies*, *Cupressus*, *Juniperus*, *Larix*, *Picea*, *Pinus*, *Pseudotsuga*, *Sequoia*, *Tsuga*, *Acer*, *Aesculus*, *Alnus*, *Betulus*, *Buxus*, *Carpinus*, *Carya*, *Castanea*, *Eucalyptus*, *Fagus*, *Fraxinus*, *Ilex*, *Juglans*, *Platanus*, *Populus*, *Pterocarya*, *Quercus*, *Robinia*, *Salix*, *Tectona*, *Tilia* and *Ulmus*.

A glossary of the technical terms used in the bulletin and a bibliography of 605 references are appended.

NEW JOURNALS

Canadian Grain Journal

Issued monthly, the Canadian Grain Journal is devoted to the production and marketing of Canadian grain crops on relation to the livestock feeding industry, milling and the seed trade. Research articles and items, a number of them dealing with quality testing and breeding work, are included. It is published by the Journal Publishing Company, 548 Grain Exchange Building, Winnipeg.

Corn

"Corn" is an occasional publication of the Corn Industries Research Foundation, of which the first issue is dated February, 1945. Its function is to provide the general reader with a popular account of the growing, marketing and numerous industrial uses of the crop. Interesting statistical high lights are given in this sheet publication; and as examples of the contents of the first two bulletins, brief articles on hybrid maize, the use of maize steep liquor in the production of penicillin, and the domestication of maize, may be cited. It is published by the Corn Industries Research Foundation, 5 East 45th Street, New York 17, N.Y.

Portugaliae Acta Biologica, Lisboa (A)

Series A of the *Portugaliae Acta Biologica* is a new journal devoted to original papers and critical reviews on morphology, physiology, genetics and general biology. The papers are written in Portuguese, French, English or German. It is published under the auspices of the Institute of Botany of the Faculty of Sciences, Lisbon, and the Veríssimo de Almeida Laboratory of Plant Pathology of the Portuguese Biological Society; it is subsidized by the Institute of Higher Culture. The first two numbers contain several important papers on nuclear structure, a field in which Portuguese investigators have made valuable contributions. It is perhaps unnecessary to add that the printing and arrangement of the journal maintain the high standard set by other Portuguese biological journals.

Publications of the Malt Research Institute, Madison, Wisconsin

Recently the Malt Research Institute has been established at Madison, Wisconsin, with a view to co-ordinating national research on barley improvement and the industrial use of barley malts. The immediate investigation undertaken by the Institute was the detailed comparative study of two varieties of barley. The first four progress reports of this study, which is to continue for several years, have recently been received.

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